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6

No. 133

BAY OF BISCAY PILOT

WEST COAST OF FRANCE AND THE NORTH COAST OF SPAIN FROM USHANT TO CAPE TORIÑANA

U.S.-
PUBLISHED BY THE HYDROGRAPHIC OFFICE
UNDER THE AUTHORITY OF THE
SECRETARY OF THE NAVY

WASHINGTON
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GLOSSARIES OF WORDS OCCASIONALLY FOUND ON THE CHARTS AND IN THE SAILING DIRECTIONS.

FRENCH.

French.	English.
Aiguille	Needle.
Aimanté(e)	Magnetic.
Anse	Bay, creek.
Atterrissage	Making the land.
Avant port	Outer port.
Azur	Blue.
Babord	Port.
Baie	Bay, gulf.
Balisage	Beaconage.
Balise	Beacon.
Banc	Bank, sandbank.
Barre	Bar.
Basse	Shoal.
Basse mer	Low water.
Bassin	Basin, dock.
Bassin à flot	Wet basin or dock.
Bassin d'échouage	Tidal basin where vessels ground.
Bateau de sauvetage	Lifeboat.
Blanc(he)	White.
Bleu(e)	Blue.
Bouche	Mouth of a river.
Bouée	Buoy.
Bouée à cloche	Bell buoy.
Bouée à sifflet	Whistle buoy.
Bouée lumineuse	Light buoy.
Boussole	Compass.
Brouillard	Fog, mist.
Brume	Fog.
Caboteur	Coaster.
Cale de radoub	Patent slip.
Cap	Cape, headland.
Chapelle	Chapel.
Charbon	Coal.
Chasse	A rapid discharge of water from a reservoir in order to clear out a channel.

French.	English.
Château	Castle.
Chaussée	Bank, causeway.
Chemin de fer	Railway.
Cheminée	Chimney.
Chenal	Channel.
Clocher	Steeple.
Colline	Hill.
Compas	Compass.
Coquilles	Shells.
Côte	Coast.
Courant	Current, stream; a name given to streams flowing into the sea between Arcachon and Cap Breton.
Courant de flot	Flood tidal stream.
Courant de jusant	Ebb tidal stream.
Crue	Freshet or flood.
Declinaison magnetique.	Magnetic declination or variation.
Douane	Customhouse.
Échelle	Scale.
Échelle de marée	Tide gauge.
Écluse	Lock of a canal or basin.
Église	Church.
Encablure	Cable's length.
Entrée	Entrance, mouth of a river.
Escarpé(e)	Bluff.
Étale	(Of tide) slack; (of wind) settled.
Étang	Lake.
Étarqué	Hoisted (as a sail, flag, or time ball).
Étiage	Low-water mark of a river.

French.	English.
Étier	A creek which can receive small vessels; a conduit by which salt water enters a lake to be transformed into salt.
Falaise	Cliff.
Fanal	Harbor lighthouse.
Feu	Light.
Feu permanent	A light constantly burning and unwatched.
Fin (e)	Fine.
Flèche	Spire.
Fleuve	River, stream.
Flot	Flood.
Foc	Jib (sail).
Fond	Bottom.
Forme de radoub	Dry dock.
Fosse	Ditch, a deep.
Gare	Station.
Golfe	Gulf.
Goulet	Narrow entrance.
Grand (e)	Great.
Gravier	Gravel.
Gril de carenage	Gridiron.
Gros	Coarse.
Haut-fond	A shoal.
Haute mer	High water.
Houle	Swell.
Ile	Island, isle.
Ilot	Islet.
Jaune	Yellow.
Jusant	Ebb.
Lac	Lake.
Madrague	Tunny net.
Marias	Swamp, marsh.
Marée	Tide.
Marée descendante.	Falling tide.
Marée montante	Rising tide.
Mât	Mast.
Menhir	A large raised stone, the erection of which may be traced to antiquity. (From the Celtic, maen, stone; hir, high.)
Môle	Mole, pier.
Molle	Soft.
Mortes eaux	Neap tides.
Mouillage	Anchorage.
Moulin	Mill.
Mur	Wall.
Musoir	Mole or pierhead.
Niveau	Level.
Nœud	Knot.
Noir (e)	Black.
Occidental (e)	Western.
Onde	Wave.
Oriental (e)	Eastern.
Passe	Channel.
Patente de santé	Bill of health.
Pertuis	Opening or strait.
Petite (e)	Small.
Phare	Lighthouse.
Pic	Peak.
Pierre	Stone.
Pignon	Gable.
Pilote	Pilot.
Pin	Pine or fir tree.
Plage	Shore, beach.
Plateau	Table-land, or flat below water.
Pleine mer	High water.
Pointe	Point.
Pont	Bridge, deck.
Port	Port, harbor.
Presqu'île	Peninsula.
Quai	Quay, wharf.
Rade	Road, roadstead.
Rafale	Squall.
Raz (Bas Breton)	A name given to a violent tidal stream in a narrow passage.
Rivière	River.
Roche	Rock.
Rocher	Rock.
Rouge	Red.
Sable	Sand.
Salines	Salt water lagoon, salt works.
Seuil	Sill (as of a dock).
Temps	Time, weather.
Tour	Tower.

French.	English.
Tourelle	Small tower, turrett.
Tribord	Starboard.
Usine	Factory.
Vase	Mud.
Vent	Wind.

French.	English.
Vergue	Yard.
Vert	Green.
Vieux, vieil, vieille	Old, ancient.
Village	Village.
Ville	Town.
Vives eaux	Spring tides.

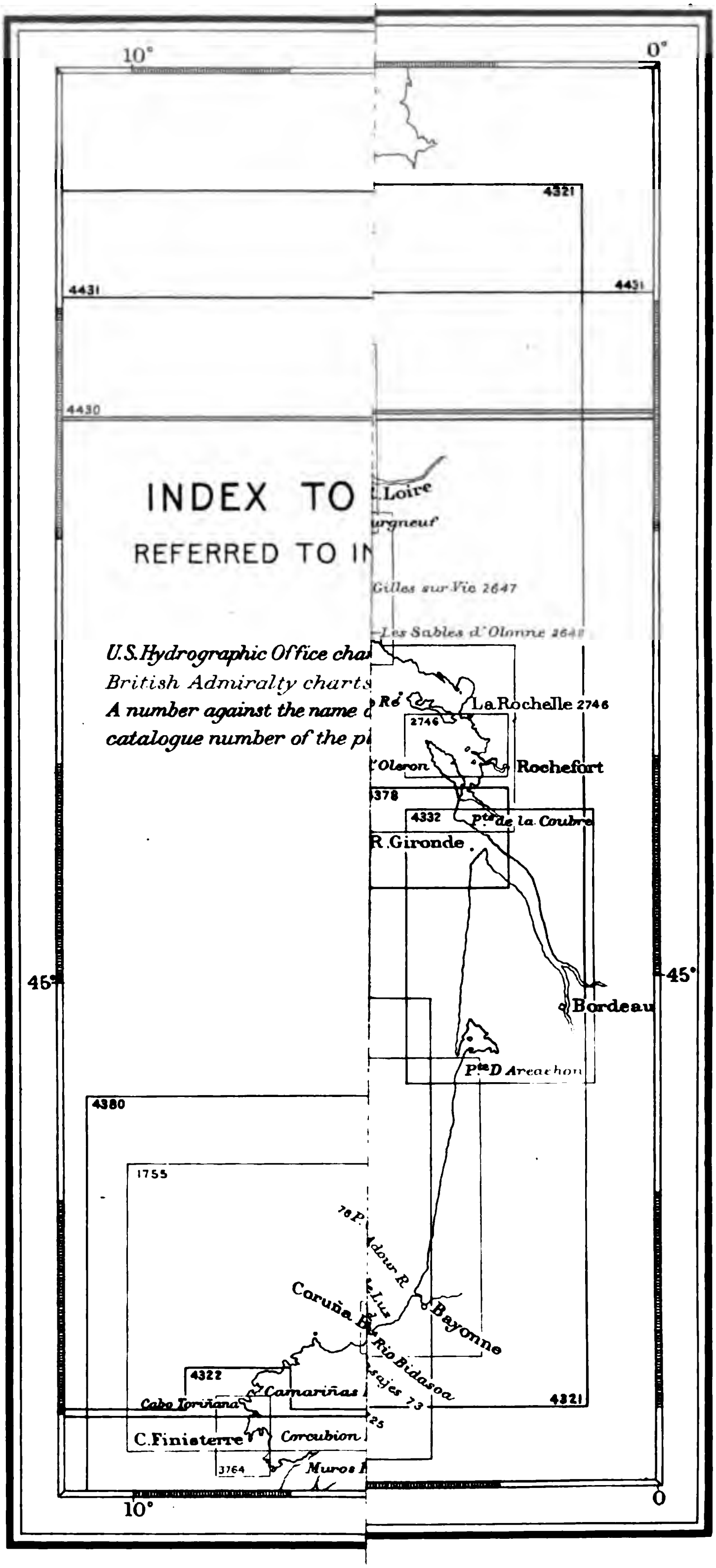
SPANISH.

Spanish.	English.
Aduana	A customhouse.
Aguas muertas	Neap tides.
Aguas vivas	Spring tides.
Aguja	A needle.
Aldea	A small village; a hamlet.
Almadraba	A tunny fishery.
Alto	A height.
Amarillo	Yellow.
Arena	Sand.
Arrecife	A reef.
Arroyo	A rivulet.
Astillero	A dockyard.
Atalaya	An elevated place from which a considerable view may be obtained.
Babor	Port.
Bahia	A bay.
Bajamar	Low water.
Bajo	A shoal.
Banco	A bank.
Barra	A bar at the mouth of a river or harbor.
Barrio	A suburb; a district of a town.
Blanco	White.
Bote salvavidas	A lifeboat.
Boya	A buoy.
Brujula	A compass.
Bruma	Fog; haze.
Cabo	A cape or headland.
Cala	A creek or small bay.
Caleta	A cove.
Camino de hierro	A railway.
Campanario	A steeple; a belfry.
Canal	A channel or strait.
Capilla	A chapel.
Carabineros	A post of military coast guards.

Spanish.	English.
Carbon de piedra	Coal.
Carta de sanidad	Bill of health.
Casa	A house.
Cascajo	Gravel.
Caseta	A small house.
Castillo	A castle.
Cerrazon	Dark, cloudy weather.
Cerro	A hill.
Chica	Small.
Concha	A shell.
Contrastes	Winds blowing from opposite directions.
Cubierta	A deck.
Cueva	A cave.
Darsena	A dock or basin.
Dique	A dock.
Dique seco	A dry dock.
Ensenada	A bay or creek.
Ermita	A hermitage.
Escollo	A rock.
Espigon	A kind of wharf or pier.
Estero	A small creek.
Estrecho	A strait.
Estribor	Starboard.
Fanal	A lighthouse.
Fango	Mud.
Faro	A lighthouse.
Ferro carril	A railway.
Fondeadero	Anchorage.
Fraile	A friar.
Freo or freu	A strait.
Fuente	A fountain; a spring of water.
Garita	A lookout house.
Golfo	A gulf or bay.
Grande	Great.
Gris	Gray.

Spanish.	English.
Iglesia	A church.
Isla	An island.
Isleta	An islet.
Laja	A flat rock.
Lajo	A lake.
Limo	Mud.
Lugar	A village or small town.
Luz	A light.
Marea	Tide.
Marea creciente	Flood tide.
Marea menguante	Ebb tide.
Meridional	Southern.
Mesa	A table-land.
Molino	A mill.
Monte	A mountain.
Muelle	A mole or jetty.
Negro	Black.
Niebla	Fog.
Ola	A wave.
Onda	A wave.
Pardo	Gray.
Peña	A rock or large stone.
Peñon	A rock or rocky mountain.
Pico	A peak.
Piedra	A rock.
Piloto	A pilot.
Piloto practico	A harbor pilot (practico is often used alone).
Playa	A beach.
Pleamar	High water.

Spanish.	English.
Pueblo	A town; a village.
Puente	A bridge.
Puerto	A port.
Punta	A point.
Quinta	A country house.
Recalada	Making the land.
Restinga	A reef.
Ria	The mouth of a river.
Ribera	The shore; the bank of a river.
Rio	A river.
Roca	A rock.
Rojo	Red.
Saco	A bay.
Salina	A salt pan.
Sanidad	Health.
Seno	A gulf or bay.
Septentrional	Northern.
Sierra	A mountain ridge.
Temporal	A storm.
Terral	A land wind.
Tiempo	Weather.
Torre	A tower.
Variacion	Variation.
Vela	A sail.
Vendaval	A southwesterly wind.
Venta	A poor inn.
Verde	Green.
Viejo	Old.
Viento	Wind.
Vigia	A lookout; doubtful shoals.
Villa	A town.
Virazon	A sea breeze.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PREFACE.

This publication comprises the sailing directions for the west coast of France and the north coast of Spain from Ushant to Cape Toriñana. It cancels all Notices to Mariners up to and including No. 21 of 1915.

The information contained in this publication is taken from all available sources and principally from British Admiralty publication "West Coasts of France, Spain, and Portugal."

The bearings and courses are true and given in degrees, from 0° to 360°, commencing at north and increasing to the right.

The directions of the winds refer to the points from which they blow; of currents, the points toward which they set. These directions are *true*.

Bearings limiting sectors of lights are toward the light.

Variations for the year, with the annual rate of change, may be obtained from H. O. chart No. 2406, Variation of the Compass.

Distances are expressed in nautical miles, the mile being approximately 2,000 yards.

Soundings are referred to low-water ordinary springs, excepting those referring to France, which are reduced to the lowest tide observed; that is, lower even than mean equinoctial springs.

Heights are referred to mean high water.

The latest information concerning lights, characteristics, sectors, and fog signals should always be sought in H. O. publication No. 32, List of Lights, volume III.

Attention is invited to the coupons on the first pages of this book, which entitle the purchaser to a summary of the Notices to Mariners affecting this publication. They will be ready for distribution as soon as practicable after the first of each year, beginning January, 1917.

Mariners are requested to notify the United States Hydrographic Office, directly or through one of its branch offices, of any new information obtained or of any errors or omissions discovered in this publication.

INFORMATION RELATING TO NAVIGATIONAL AIDS AND GENERAL NAVIGATION.

THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

The following publications are issued by the United States Hydrographic Office as guides to navigation: Charts, Chart Catalogues, Sailing Directions, Light Lists, Tide Tables, Notices to Mariners, Pilot Charts, and Hydrographic Bulletins. Of these, the Notices to Mariners and the Hydrographic Bulletins are free to mariners and others interested in shipping. The Pilot Charts are free to contributors of professional information, but are sold to the general public at 10 cents a copy. The other publications of the office are sold under the law at cost price.

The Charts, the Sailing Directions, and the Light Lists are all affected by continual changes and alterations, concerning which information from all parts of the world is published weekly in the Notices to Mariners.

The charts are always corrected for all available information up to the date of issue stamped upon them; and the Light Lists should be noted for the recent alterations and additions. The Sailing Directions, however, can not, from their nature, be so fully corrected, and in all cases where they differ from the charts, the charts must be taken as the guide.

Charts.—When issued from the Hydrographic Office, the charts have received all necessary corrections to date.

All small but important corrections that can be made by hand are given in the Notices to Mariners, and should at once be placed on the charts to which they refer.

Extensive corrections that can not be conveniently thus made are put upon the plates, and new copies are put on sale. Masters of vessels are urged to replace the old charts, which should be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which extensive corrections are made are noted on the chart on the right of the middle of the lower edge; those of the smaller corrections at the left lower corners.

The edition, and corresponding date, of the chart will be found in the right lower corner, outside the outer neat line.

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (found in the lower right and upper left corners), in order that the edition of the chart referred to may be known.

The Light Lists are corrected before issue, and all changes are published in the weekly Notices to Mariners.

The navigating officer should make notations in the tabular form in the Light Lists and paste in at the appropriate places slips from the Notices to Mariners.

The Light Lists should always be consulted as to the details of a light, as the description in the sailing directions is not complete, and may be obsolete, in consequence of changes since publication.

The Sailing Directions or Pilots are kept corrected by addenda; and subsequent to date of last addenda, they should be kept corrected by means of the Notices to Mariners. Sailing Directions issued to naval vessels carry with them an envelope containing slips of corrections up to date of issue.

Addenda are published from time to time, and contain a summary of all the information received up to date since the publication of the volume to which they refer, canceling all previous Notices to Mariners.

To enable the books to be more conveniently corrected, addenda and Notices to Mariners are printed on one side only, and two copies of the latter are issued to each naval vessel, one to be cut and the slips pasted in at the appropriate places, the other to be retained intact for reference.

To paste in the slips, as the Notices to Mariners are received, is one of the duties of the navigating officer, demanding faithful attention.

It must, however, be understood that Sailing Directions will rarely be correct in all details, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide, for which purpose, for ordinary navigation, it is sufficient.

The Tide Tables, which are published annually by the United States Coast and Geodetic Survey, give the predicted times and heights of the high and the low waters for every day in the year at 70 of the principal ports of the world, and, through the medium of these by means of tidal differences and ratios, at a very large number of subordinate ports. The tables for the Atlantic and the Pacific coast ports of the United States are also published separately.

It should be remembered that these tables aim to give the times of high and low water, and not the times of turning of the current or of slack water, which may be quite different.

Notices to Mariners, containing fresh information pertaining to all parts of the world, are published weekly and mailed to all

United States ships in commission, Branch Hydrographic offices and agencies, and United States consulates. Copies are furnished free by the main office or by any of the branch offices on application.

With each Notice to naval vessels is sent also a separate sheet, giving the items relating to lights contained in the latest Notice, intended especially for use in correcting the Light Lists.

Pilot Charts of the North Atlantic, Central American Waters, and North Pacific and Indian Oceans are published each month, and of the South Atlantic and South Pacific Oceans each quarter. These charts give the average conditions of wind and weather, barometer, percentage of fog and gales, routes for steam and sailing vessels for the period of issue, ice and derelicts for the preceding period, ocean currents and magnetic variation for the current year, storm tracks for preceding years, and much other useful information. They are furnished free only in exchange for marine data or observations.

Hydrographic Bulletins, published weekly, are supplemental to the Pilot Charts, and contain the latest reports of obstructions and dangers along the coast and principal ocean routes, ice, derelicts, and wreckage, reports of the use of oil to calm the sea, and other information for mariners. They are to be had free upon application.

THE USE OF CHARTS.

Accuracy of chart.—The value of a chart must manifestly depend upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become.

To judge of a survey, its source and date, which are generally given in the title, are a good guide. Besides the changes that may have taken place since the date of the survey, in waters where sand or mud prevails, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail; until a chart founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbors and their approaches, no surveys yet made have been so thorough as to make it certain that all dangers have been found. The number of the soundings is another method of estimating the completeness of the survey, remembering, however, that the chart is not expected to show all the soundings that were obtained. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

Large or irregular blank spaces among soundings mean that no soundings were obtained in these spots. When the surrounding soundings are deep it may fairly be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch or pinnacle rock.

A wide berth should therefore be given to every rocky shore or patch, and instead of considering a coast to be clear, the contrary should be assumed.

Fathom curves a caution.—Except in charts of harbors that have been surveyed in detail, the 5-fathom curve on most charts may be considered as a danger line or caution against unnecessarily approaching the shore or bank within that line, on account of the possible existence of undiscovered inequalities of the bottom, which only an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for so detailed a survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The 10-fathom curve on rocky shores is another warning, especially for ships of heavy draft.

A useful danger curve will be obtained by tracing out with a colored pencil, or ink, the line of depth next greater than the draft of the ship using the chart. For vessels drawing less than 18 feet the edge of the sanding serves as a well-marked danger line.

Charts on which no fathom curves are marked must especially be regarded with caution, as indicating that soundings were too scanty and the bottom too uneven to enable the curves to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed around, as it is doubtful how closely the spot may have been examined and whether the least depth has been found.

The chart on largest scale should always be used on account of its greater detail and the greater accuracy with which positions may be plotted on it.

Caution in using small-scale charts.—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on one of small scale the same amount of displacement means a large fraction of a mile.

Distortion of printed charts.—The paper on which charts are printed from engraved plates has to be damped. On drying distortion takes place from the inequalities of the paper, which greatly varies with different papers and the amount of the damping; but it does not affect navigation. The larger the chart the greater the amount of this distortion. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted on the chart, especially if the lines to objects be long.

Mercator chart.—Observed bearings are not identical with those measured on the Mercator chart (excepting only the bearings north and south, and east and west on the equator) because the line of sight, except as affected by refraction, is a straight line and lies in the plane of the great circle, while the straight line on the chart (except the meridian line) represents, not the arc of a great circle, but the loxodromic curve, or rhumb line, which on the globe is a spiral approaching but never in theory reaching the pole, or, if the direction be east and west, a circle of latitude.

The difference is not appreciable with near objects, and in ordinary navigation may be neglected. But in high latitudes, when the objects are very distant and especially when lying near east or west, the bearings must be corrected for the convergence of the meridians in order to be accurately placed on the Mercator chart, which represents the meridians as parallel.

On the polyconic chart, since a straight line represents (within the limits of 15 or 20 degrees of longitude) the arc of a great circle or the shortest distance between two points, bearings of the chart are identical with observed bearings.

The mercator projection is unsuited to surveying, for which purpose the polyconic projection is used by the Hydrographic Office and the Coast and Geodetic Survey.

Notes on charts should always be read with care, as they may give important information that can not be graphically represented.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact positions. They should therefore be regarded as warnings, and not as infallible navigational marks, especially when in exposed places and in the wintertime; and a ship's position should always, when possible, be checked by bearings or angles of fixed objects on shore.

Gas buoys.—The lights shown by gas buoys can not be implicitly relied on; the light may be altogether extinguished, or, if periodic, the apparatus may get out of order.

Whistle and bell buoys are sounded only by the action of the sea; therefore, in calm weather, they are less effective or may not sound.

Lights.—All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of 15 feet for the observer's eye. The effect of a greater or less height of eye can be ascertained by means of the table of distances of visibility due to height, published in the Light Lists.

The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Refraction, too, may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light, the fact may be forgotten that aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be obtained from the standard compass when you lay down from aloft.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the ship is on the circle of visibility corresponding with the usual height of the eye, or unexpectedly nearer the light.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by its candlepower or order, as stated in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range corresponding to its height. Thus, a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Fog signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the influence of the wind large areas of silence have been found in different directions and at different distances from the origin of sound, even in clear weather; therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly toward the land, and may not be observed by the lighthouse keepers until upon them; a ship may have been for many hours in it, and approaching the land in confidence, depending on the signal, which is not sounded. When sound travels against the wind, it may be thrown upward; a man aloft might then hear it though inaudible on deck.

The submarine bell system of fog signals is much more reliable than systems transmitting sound through the air, as sound traveling in water is not subject to the same disturbing influences; the fallibility of the lighthouse keeper is, however, about the same in all systems, so that caution should be observed even by vessels equipped with submarine-bell receiving apparatus.

Submarine bells have an effective range of audibility greater than signals sounded in air, and a vessel equipped with receiving apparatus may determine the approximate bearing of the signal. These signals may be heard also on vessels not equipped with receiving apparatus by observers below the water line, but the bearing of the signal can not then be readily determined.

Vessels equipped with radio apparatus and submarine bell receivers may fix their distance from a light vessel having radio and submarine bell, utilizing the difference in velocity of sound waves of the radio and the bell. Sound travels 4,794 feet per second at 66° F. in water, and the travel of radio sound waves for practicable distances may be taken as instantaneous.

All vessels should observe the utmost caution in closing the land in fogs. The lead is the safest guide and should be faithfully used.

Tides.—A knowledge of the times of high and low water and of the amount of vertical rise and fall of the tide is of great importance in the case of vessels entering or leaving port, especially when the low water is less than or near their draft. Such knowledge is also useful at times to vessels running close along a coast, in enabling them to anticipate the effect of the tidal currents in setting them on or offshore. This is especially important in fog or thick weather.

The predicted times and heights of the high and low waters, or differences by which they may be readily obtained, are given in the Tide Tables for all the important ports of the world. The height at any intermediate time may be obtained by means of Tables 2A and 2B for most of the principal tidal stations of the United States, given in Table 1, and for the subordinate stations of Table 3 by using them as directed in the Tide Tables. The intermediate height may also be obtained by plotting the predicted times and heights of high and low water and connecting the points by a curve. Such knowledge is often useful in crossing a bar or shallow flats.

Planes of reference.[1]—The plane of reference for soundings on Hydrographic Office charts made from United States Government surveys and on Coast and Geodetic Survey charts of the Atlantic coast of the United States is mean low water; on the Pacific coast of the United States as far as the Strait of Juan Fuca, it is the mean of the lower low waters; and from Puget Sound to Alaska, the plane employed on Hydrographic Office charts is low water ordinary springs.

On most of the British Admiralty charts the plane of reference is the low water of ordinary springs; on French charts, the low water of equinoctial springs.

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[1] The distinction between "rise" and "range" of the tide should be understood. The former expression refers to the height attained above the datum plane for soundings, differing with the different planes of reference; the latter, to the difference of level between successive high and low waters.

In the case of many charts compiled from old or various sources the plane of reference may be in doubt. In such cases, or whenever not stated on the chart, the assumption that the reference plane is low water ordinary springs gives a larger margin of safety than mean low water.

Whichever plane of reference may be used for a chart it must be remembered that there are times when the tide falls below it. Low water is lower than mean low water about half the time, and when a new or full moon occurs at perigee the low water is lower than the average low water of springs. At the equinoxes the spring range is also increased on the coasts of Europe, but in some other parts of the world, and especially in the Tropics, such periodic low tides may coincide more frequently with the solstices.

Wind or a high barometer may at times cause the water to fall below even a very low plane of reference.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can not be depended upon and additional caution is necessary.

Mean sea level.—The important fact should be remembered that the depths at half tide are practically the same for all tides, whether neaps or springs. Half tide therefore corresponds with mean sea level. This makes a very exact plane of reference, easily found, to which it would be well to refer all high and low waters.

The Tide Tables give in Table 3, for all the ports, the plane of reference to which tidal heights are referred and its distance below mean sea level.

If called on to take special soundings for the chart at a place where there is no tidal bench mark, mean sea level should be found and the plane for reductions established at the proper distance below it, as ascertained by the Tide Tables, or by observations, or in some cases, if the time be short, by estimation, the data used being made a part of the record.

Tidal streams.—In navigating coasts where the tidal range is considerable, especial caution is necessary. It should be remembered that there are indrafts to all bays and bights, although the general run of the stream may be parallel with the shore.

The turn of the tidal stream offshore is seldom coincident with the times of high and low water on the shore. In some channels the tidal stream may overrun the turn of the vertical movement of the tide by three hours, forming what is usually known as tide and half tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

The effect of the tidal wave in causing currents may be illustrated by two simple cases.

(1) Where there is a small tidal basin connected with the sea by a large opening.

(2) Where there is a large tidal basin connected with the sea by a small opening.

In the first case the velocity of the current in the opening will have its maximum value when the height of the tide within is changing most rapidly, i. e., at a time about midway between high and low water. The water in the basin keeps at approximately the same level as the water outside. The flood stream corresponds with the rising and the ebb with the falling of the tide.

In the second case the velocity of the current in the opening will have its maximum value when it is high water or low water without, for then there is the greatest head of water for producing motion. The flood stream begins about three hours after low water, and the ebb stream about three hours after high water, slack water thus occurring about midway between the tides.

Along most shores not much affected by bays, tidal rivers, etc., the current usually turns soon after high water and low water.

The swiftest current in straight portions of tidal rivers is usually in the middle of the stream, but in curved portions the most rapid current is toward the outer edge of the curve, and here the water will be deepest. The pilot rule for best water is to follow the ebb tide reaches.

Countercurrents and eddies may occur near the shores of straits, especially in bights and near points. A knowledge of them is useful in order that they may be taken advantage of or avoided.

A swift current often occurs in a narrow passage connecting two large bodies of water, owing to their considerable difference of level at the same instant. The several passages between Vineyard Sound and Buzzards Bay are cases in point. In the Woods Hole passage the maximum strength of the tidal streams is at about half tide.

Tide rips are made by a rapid current setting over an irregular bottom, as at the edges of banks where the change of depth is considerable.

Current arrows on charts show only the most usual or the mean direction of a tidal stream or current; it must not be assumed that the direction of a stream will not vary from that indicated by the arrow. The rate, also, of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

FIXING POSITION.

Sextant method.—The most accurate method available to the navigator of fixing a position relative to the shore is by plotting with a protractor, sextant angles between three well-defined objects on shore which are shown on the chart; this method, based on the "three-point problem" of geometry, should be in general use.

For its successful employment it is necessary: First, that the objects be well chosen; and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice. Two observers are better for this method.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn.

On the other hand distant objects should be used for direction, because less affected by a small error or change of position.

The three-arm protractor or station pointer consists of a graduated brass circle with one fixed and two movable radial arms, the three beveled edges of the arms, if produced, intersecting at the exact center of the instrument. The edge of the fixed arm marks the zero of the graduation which enables the movable arms to be set at any angles with the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole.

The transparent xylonite protractor is an excellent substitute for the brass instrument and in some cases preferable to it, as when, for instance, the objects angled on are so near the observer that they are more or less hidden by the circle of the instrument. The xylonite protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The value of a determination depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through three objects (in which case the sum of the observed angles equals the supplement of the angle at the middle object made by lines from the other two) it will be indeterminate, as it will plot all around the circle. Such an observation is called a "revolver." An approach to this condition must be avoided. Near objects are better than distant ones, and, in general, up to 90° the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation.

A single angle and a range of two objects give in general an excellent fix, easily obtained and plotted.

Advantages of sextant method.—In many narrow waters where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by its means. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might under such circumstances put the ship ashore.

In all cases where great accuracy of position is desired, such as the fixing of a rock or shoal, or of fresh soundings or new buildings as additions to the chart, the sextant should invariably be used. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. If a round of angles can be taken the observer's accuracy is also checked. In the case of ordinary soundings a third angle need be taken only occasionally; first, to check the general accuracy of the chart, as above stated; second, to make certain that the more important soundings, as at the end of a line, are correctly placed.

If communication can be had with the shore, positions may be fixed with great accuracy by occupying with theodolite or sextant two known points of the chart. The third angle of the triangle, that between the two points at the position sought, should be measured as a check.

The compass.—It is not intended that the use of the compass to fix the ship should be given up; in ordinary piloting the compass, with its companion, the pelorus, may be usefully employed for this purpose, although less accurate than the sextant.

If the accuracy of the chart is doubtful, the compass should be used in preference to the sextant.

In fixing by the compass, it should always be remembered that a position by two bearings only, like that by two angles only, is liable to error. An error may be made in taking a bearing, or in applying to it the deviation, or in laying it on the chart. A third or check bearing should, therefore, be taken of some other object, especially when near the shore or dangers. A common intersection for the three lines assures accuracy.

When the three lines do not intersect in a point, the following rule holds: If the line drawn to the middle object falls to the right of the point of intersection of the lines to the two outside objects, the position of the observer was to the right of the line to the middle object; and if it falls to the left of the intersection his position was to the left of the line. Thus it will be seen that the assumption, that the position is at the center of the triangle formed by the intersecting lines, is incorrect.

Doubling the angle on the bow.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing," the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy, and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam before the position is obtained.

By taking the bearings at two points and four points on the bow, a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current. Taking afterwards the beam bearing gives, with slight additional trouble, the distance of the object when abeam; such beam bearings and distances, with the times, should be continuously recorded as fresh departures, the importance of which will be appreciated in cases of being suddenly shut in by fog.

When the first bearing is 26½° from ahead, and the second 45°, the run between bearings will equal the distance at which the object will be passed abeam.

A table of multipliers of the distance run in the interval between any two bearings of an object, the product being its distance at the time of the second bearing, is given in the Light Lists and in Bowditch.

Danger angle.—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten. In employing the horizontal danger angle, however, caution is necessary, as should the chart be inaccurate, i. e., should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

The vertical danger angle may be conveniently used when passing elevated points of known heights, such as lighthouses, cliffs, etc. The computation of the distance corresponding to the height of the object and its angular elevation requires for small distances merely the solution of a plain right triangle; the natural cotangent of the angle multiplied by the height in feet gives the distance in feet. The convenient use of this method, however, requires tables such as those published by Capt. Lecky in his little book entitled "The Danger Angle and Offshore Distance Tables." This book very usefully extends the vertical angle method to finding a ship's position at sea by observing the angular altitude of a peak of known height and its bearing. The tables give heights up to 18,000 feet and distances up to 110 miles.

When the angles are not too large they should be observed "on and off the limb" and the index error of the sextant thus eliminated, in preference to correcting for it the single altitude. It must be remembered that in high latitudes the bearing of a distant object needs correction for the convergence of the meridians before being laid down on a Mercator chart. The correction may be found by the following formula, using the approximate position: The sine of the correction equals the product of the sine of half the difference of longitude by the sine of the middle latitude. It is applied on the equatorial side of the observed bearing and its effect is always to increase the latitude of the observer.

Soundings taken at random are of little value in fixing or checking position and may at times be misleading. In thick weather, when near or closing the land, soundings should be taken continuously and at regular intervals, and, with the character of the bottom, systematically recorded. By laying the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship, and then moving the paper over the chart, keeping the line representing the track parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined. This plan was suggested by Lord Kelvin, whose admirable sounding machine renders the operation of sounding possible in quite deep water, without slowing down the ship and consequent loss of time.

Pelorus.—All ships should be supplied with the means of taking accurate bearings both by night and by day. The standard compass is not always conveniently placed for the purpose; in such case a pelorus will be very useful, but the results are not as accurate as those obtained direct from the compass. The utility of such an instrument in ascertaining the change of bearing of an approaching ship should not be overlooked.

Position lines.—Among the various methods of fixing position at sea, the one which should be best understood and put to the most constant use is that employing position or Sumner lines. These lines give the most comprehensive information to the navigator with the least expenditure of labor and time. The knowledge gained is that the vessel must be somewhere on the line, provided the data used is accurate and the chronometer correct. As the information given by one line of position is not sufficient to determine the definite location of the vessel, it is necessary to cross this line by another similarly obtained, and the vessel being somewhere on both must be at their intersection. However, a single line, at times, will furnish the mariner with invaluable information; for instance, if it is directed toward the coast, it marks the bearing of a definite point on the shore, or if parallel to the coast it clearly indicates the distance off, and so will often be found useful as a course. A sounding taken at the same time with the observation will in certain conditions prove of great value in giving an approximate position on the line.

The easiest and quickest way to establish a line of position is by employing the method of Marcq St. Hilaire, as modified by the use of tables of altitude. The principle of this method is one of altitude differences, in which the observed altitude is compared with the computed altitude for a dead reckoning, or other selected position, and the difference in minutes of latitude measured toward the body along the line of its azimuth, if the observed altitude is greater than the computed altitude, and vice versa. A line drawn at right angles to the line of azimuth through the point thus determined is the position line, somewhere upon which will be found the position of the vessel. The tables of altitude obviate the computation of the altitude and thereby greatly facilitate the establishment of the line.

A position line may also be found by computing two positions for longitude with two assumed latitudes, and drawing the line between them; or by drawing to the position obtained with one latitude a line at right angles to the bearing of the body as taken from the azimuth tables.

A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The position lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterwards or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day and in combination with the sun gives an excellent fix.

The morning and evening twilight observations, besides their great accuracy, possess the additional advantage of greatly extending the ship's reliable reckoning beyond the limits of the ordinary day navigation, and correspondingly restricting the dead reckoning uncertainties of the night. An early morning fix in particular is often of great value. Though the same degree of accuracy as at twilight can not be expected, night observations are very valuable and should be assiduously practiced.

Piloting.—The navigator, in making his plan for entering a strange port, should give very careful previous study to the chart and sailing directions, and should select what appear to be the most suitable marks for use, also providing himself with substitutes to use in case those selected as most suitable should prove unreliable in not being recognized with absolute certainty. Channel buoys seen from a distance are difficult to identify, because their color is sometimes not easily distinguished and they may appear equally distant from the observer even though they be at widely varying distances. Ranges should be noted, if possible, and the lines drawn, both for leading through the best water in channels, and also for guarding against particular dangers; for the latter purpose safety bearings should in all cases be laid down where no suitable ranges appear to offer. The courses to be steered in entering should also be laid down and distances marked thereon. If intending to use the sextant and danger angle in passing dangers, and especially in passing between dangers, the danger circles should be plotted and regular courses planned, rather than to run haphazard by the indications of the angle alone, with the possible trouble from bad steering at critical points.

The ship's position should not be allowed to be in doubt at any time, even in entering ports considered safe and easy of access, and should be constantly checked, continuing to use for this purpose those marks concerning which there can be no doubt until others are unmistakably identified.

The ship should ordinarily steer exact courses and follow an exact line, as planned from the chart, changing course at precise points, and, where the distances are considerable, her position on the line should be checked at frequent intervals. This is desirable even where it may seem unnecessary for safety, because if running by the eye alone and the ship's exact position be immediately required, as in a sudden fog or squall, fixing at that particular moment may be attended with difficulty.

The habit of running exact courses with precise changes of course will be found most useful when it is desired to enter port or pass through inclosed waters during fog by means of the buoys; here safety demands that the buoys be made successively, to do which requires, if the fog be dense, very accurate courses and careful attention to the times, the speed of the ship, and the set of the current; failure to make a buoy as expected leaves, as a rule, no safe alternative but to anchor at once, with perhaps a consequent serious loss of time.

In passing between dangers where there are no suitable leading marks, as, for instance, between two islands or an island and the main shore, with dangers extending from both, a mid-channel course may be steered by the eye alone with great accuracy, as the eye is able to estimate very closely the direction midway between visible objects.

In piloting among coral reefs or banks, a time should be chosen when the sun will be astern, conning the vessel from aloft or from an elevated position forward. The line of demarcation between the deep water and the edges of the shoals, which generally show as green patches, is indicated with surprising clearness. This method is of frequent application in the numerous passages of the Florida Keys.

Changes of course should in general be made by exact amounts, naming the new course or the amount of the change desired, rather than by ordering the helm to be put over and then steadying when on the desired heading, with the possibility of the attention being diverted and so of forgetting in the meantime, as may happen, that the ship is still swinging. The helmsman, knowing just what is desired and the amount of the change to be made, is thus enabled to act more intelligently and to avoid bad steering, which in narrow channels is a very positive source of danger.

Coast piloting involves the same principles and requires that the ship's position be continuously determined or checked as the landmarks are passed. On well-surveyed coasts there is a great advantage in keeping near the land, thus holding on to the marks and the soundings, and thereby knowing at all times the position, rather than keeping offshore and losing the marks, with the necessity of again making the land from vague positions, and perhaps the added inconvenience of fog or bad weather, involving a serious loss of time and fuel.

The route should be planned for normal conditions of weather, with suitable variations where necessary in case of fog or bad weather or making points at night, the courses and distances, in case of regular runs over the same route, being entered in a notebook for ready reference, as well as laid down on the chart. The danger circles for either the horizontal or the vertical danger angles should be plotted, wherever the method can be usefully employed, and the angles marked thereon; many a mile may thus be saved in rounding dangerous points with no sacrifice in safety. Ranges should also be marked in, where useful for position or for safety, and also to use in checking the deviation of the compass by comparing, in crossing, the compass bearing of the range with its magnetic bearing, as given by the chart.

Changes of course will in general be made with mark or object abeam, the position (a new "departure") being then, as a rule, best and most easily obtained. The pelorus should be at all times in readiness for use, and the chart where it may be readily consulted by the officer of the watch. The sextant should also be kept conveniently at hand.

A continuous record of the progress of the ship should be kept by the officer of the watch, the time and patent-log reading of all changes of course and of all bearings, especially the two and four point bearings, with distance of object when abeam, being noted in a book kept in the pilot house for this especial purpose. The ship's reckoning is thus continuously cared for as a matter of routine and without the presence or particular order of the captain or navigating officer. The value of thus keeping the reckoning always fresh and exact will be especially appreciated in cases of sudden fog or when making points at night.

Where the coastwise trip must be made against a strong head wind, it is desirable, with trustworthy charts, to skirt the shore as closely as possible in order to avoid the heavier seas and adverse current that prevail farther out. In some cases, with small ships, a passage can be made only in this way. The important saving of coal and of time, which is even more precious, thus effected by skillful coast piloting makes this subject one of prime importance to the navigator.

Change in the variation of the compass.[1]—The gradual change in the variation must not be forgotten in laying down on the chart courses and bearings. The magnetic compasses placed on the charts for the purpose of facilitating the plotting become in time slightly in error, and in some cases, such as with small scales or when the lines are long, the displacement of position from neglect of this change may be of importance. The date of the variation and the annual change, as given on the compass rose, facilitate corrections when the change has been considerable. The compasses are reengraved once in ten years; more frequent alterations on one spot in a copperplate would not be practicable.

The change in the variation is in some parts of the world so rapid as to need careful consideration, requiring a frequent change of the course. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles.

Local magnetic disturbance of the compass on board ship.—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship. Observation shows that disturbance of the compass in a ship afloat is experienced in only a few places on the globe.

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[1] See H. O. Chart No. 2406, Variation of the Compass.

Magnetic laws do not permit of the supposition that the visible land causes such disturbance, because the effect of a magnetic force diminishes so rapidly with distance that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong, the compass may be temporarily deflected when passing over such a spot; but the area of disturbance will be small unless there are many centers near together.

Use of oil for modifying the effect of breaking waves.— Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skillfully applied, may prevent much damage both to ships, especially of the smaller classes, and to boats by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:

1. On free waves, i. e., waves in deep water, the effect is greatest.
2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.
3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when no other oil is obtainable, or it may be mixed with other oils; all animal and vegetable oils, such as waste oil from the engines, have great effect.
4. In cold water, the oil, being thickened by the low temperature and not being able to spread freely, will have its effect much reduced, a rapid-spreading oil should be used.
5. A small quantity of oil suffices, if applied in such a manner as to spread to windward.
6. It is useful in a ship or boat either when running, or lying-to, or in wearing.
7. When lowering and hoisting boats in a heavy sea the use of oil has been found greatly to facilitate the operation.
8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags, capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to permit leakage. The waste pipes forward are also very useful for this purpose.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan.

On a bar, with the ebb tide running, it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside, bearing in mind that her natural tendency is always to forge ahead. If she is aground the effect of oil will depend upon attending circumstances.

11. For a boat riding in bad weather to a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat, and the bag readily hauled on board for refilling, if necessary.

NORTH COAST OF FRANCE PILOT,

INCLUDING

THE CHANNEL ISLANDS.

CHAPTER I.

GENERAL REMARKS — WINDS — SOUNDINGS — TIDES — TIDAL STREAMS—SIGNALS—PILOTAGE—BUOYAGE, ETC.

General remarks. — The water area separating the coast of France from that of the British Islands is known in France as La Manche and in Britain as the English Channel. The coasts on the opposite side of this waterway have widely different characteristics. On the English coast the soundings are mostly regular, and the shore may be approached with confidence. There are also some natural harbors suited for vessels of the largest class. On the French coast the shore is rocky and uneven, numerous dangers exist, and there are no natural harbors useful for any but small vessels.

The description of the English coast is described in British Islands Pilot, volume 1, which contains a full description of the outer soundings, currents, tidal streams, and various lines of approach to the English Channel, and of the southern coast of England from Lands End to the North Foreland, as well as the estuary of the Thames as far as the Nore and Sheerness. North Coast of France Pilot repeats such portions as apply more particularly to the approach to Ushant, and contains a description of the northern coast of France from Ushant or Île d'Ouessant to Dunkerque, including the Channel Islands. In this navigation it is important the mariner should be acquainted with the general system of winds in the Channel, as well as with the subject of fogs and mirage; and, therefore, a brief notice of these is given. To this must be added the caution that the wind has considerable effect on the strength and direction of the tidal streams, as well as on the range of the tides; and that winds from between northwest and northeast, which are the smooth-water winds on the English coast, are those which produce the heaviest seas on the French shores.

It is the more necessary to bear these facts in mind, as the nature of the French coast differs so materially from the English side of the Channel, it being almost everywhere encumbered with rocks and dangerous shoals extending in some places many miles from the shore and without a single good natural harbor or easily approached secure roadstead from one end to the other; added to which the tides have a far greater range than those on the English shore and the tidal streams are stronger and more variable in direction.

It is desirable that the seaman should have a knowledge of the various signals used at French ports, such as the weather signals, made in addition to storm warnings; also, of those for indicating the depth of water at the entrance of ports, and of the uniform system of buoyage adopted by the French Government; the rules and regulations on these and other subjects, as well as a list of the places at which the assistance or advice of an American consular officer may be obtained, are therefore given before proceeding to the description of Ushant.

Determination of ship's position.—Vessels approaching the English Channel from the southward, whether intending to make Ushant or not, should use every endeavor to maintain a continuous and accurate knowledge of their position by means of astronomical observations. When the sun has been obscured by day the horizon is often tolerably clear at night; the moon, planets, bright fixed stars, and pole star may then be used for determining the ship's position. If meridian altitudes of two stars, one north and one south, be obtained, the mean result should be within 2 or 3 miles of the correct latitude. The longitude may be obtained from observations of stars east or west, and, if necessary, the true azimuth of the object determined at the same time. In short the navigator should avail himself of the various methods by which the merest chance observations of heavenly bodies may be turned to account.

Use of the lead.—It should ever be borne in mind when approaching the land that, even under the most favorable circumstances of wind and weather, the frequent use of the lead is desirable, but when the knowledge of a ship's position is dependent on dead reckoning the lead becomes of primary importance, and its constant use indispensable to safe navigation. It is true that the soundings in very deep water can not be depended upon as absolutely exact, but experience has proved that the depths may generally be trusted within two or three fathoms. Many vessels, neglecting to sound, have run on, unconscious of their position, until actually in positions of extreme peril; and instances are only too common where such neglect has resulted fatally to ships and crews.

It must not be supposed that a single cast of the lead is sufficient; a single cast may indeed confirm error, and become a fruitful source of danger. A continuous line of soundings at known distances apart is therefore necessary when the position of the ship, out of sight of land, can not be ascertained by astronomical observations; these, being plotted and compared with those shown on the chart, will give increased confidence and lessen the possibility of mistake. Seamen would do well to bear in mind that the value of the lead is greatly enhanced by the frequency of its use.

Winds and weather.—**The prevailing winds** in the English Channel are westerly, and they greatly preponderate over easterly winds. From October to March inclusive, westerly gales are most frequent, often lasting three or four days consecutively; during May, June, and July, they are comparatively rare. Southwesterly gales are very dangerous in the eastern part of the Channel, are generally accompanied by rain, and the wind, blowing in violent gusts, sometimes, without losing strength, veers suddenly to northwest, north, or even to northeast, causing a heavy sea on the French coast southward of Cape Gris Nez. Should the wind continue from the northward with a rising barometer, its force usually moderates and the weather becomes fine; but, should it back to the southwest with a falling barometer, bad weather is sure to return. It has been remarked that gales which occur during spring tides are generally more violent and lasting than those which take place during neaps, and that they acquire their greatest strength at the beginning of the flood.

Winds from north to northeastward are sometimes strong at both entrances to the channel, but seldom acquire the force of a gale in its central portion except on the French shore; they do not usually last so long, nor does the wind shift as with those from the westward. They cause a heavy sea on the flood stream, and, during their continuance, the land is generally covered with a white fog resembling smoke, an appearance common during all easterly winds which sometimes, when of moderate force, blow with great persistence.

Southeasterly winds, accompanied by rain and a falling barometer, almost always become gales, during which the changes of wind are very varied; but their continuance from that quarter seldom lasts long; for, gales in the Channel, being mostly caused by cyclonic systems that are traveling eastward, a change of wind is to be expected, and the direction of the change depends on whether the position of the vessel is northward or southward of the track of the center of depression. If southward of it, the wind veers from southeast to south, and west; if northward, it backs to east and north. Seamen should bear in mind the well-known rule for ascertaining the position of a storm's center, or, in other words, of the area of low barometric pressure round which the wind circulates, when in the northern hemisphere, viz, to face the wind, when this central depression will be from 8 to 12 points to the right of its direction. Careful attention to the barometer and to any changes in the direction of the wind give a sure clue to future probable changes.

Moderate winds from northwest to northeast bring fine weather. During summer, regular land and sea breezes frequently become established in fine settled weather; at night, it then falls calm and a heavy dew ensues. When there is little or no dew, it is a sign of an impending change of weather.

Calms are of rare occurrence, even in summer, and do not last long. In winter, they are generally precursors of bad weather, of which there are no more certain indications than swell in the offing and surf on the coast during a calm.

Snow.—In some winters snow is abundant; the wind is often fresh and baffling in snow squalls, and the falling snow effectually obscures all objects from view. After a snow shower, there is often great difficulty in recognizing the land which may be in sight, the snow completely altering its aspect.

A change from rain to hail often accompanies or precedes sudden changes in the wind from a southerly to a more northerly direction.

The peculiar configuration of the land, as well as the great rise and fall of tide in the Gulf of St. Malo, appears to influence to a certain degree the winds and weather in that neighborhood and among the Channel Islands.

Fogs.—Fogs are frequent in all parts of the Channel, and may occur at any time of the year; they are, however, most frequent under anticyclonic conditions, especially in the winter. Thick weather, approaching to a fog, is very common. In summer fogs generally hide the land in the morning only, and disperse as the sun acquires strength; the moist haze accompanying westerly winds is more tenacious and only yields to a freshening breeze. It then frequently turns to rain and marks the commencement of bad weather.

In the eastern part of the Channel it is rare for the land to be entirely free from mist except previously to strong northeasterly winds, when it may be distinctly seen from a great distance. Westerly winds, as before remarked, frequently bring mist, rain, and low dense clouds which conceal the land from view. With easterly winds the haze which covers the land is dense in proportion as the wind is strong and lasting.

Table showing the amount in hours of fog registered at the under-mentioned lighthouses during the years 1897–1904.

Station.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Hanois lighthouse:													
1897	......	91	35	18	11	35	42	6	......	......	5	......	243
1898	4	4	......	8	25	26	36	14	8	1	......	2	128
1899	17	......	30	34	7	44	50	13	8	16	......	......	219
1900	7	1	......	4	16	32	34	8	6	......	......	2	110
1901	......	......	......	3	4	6	23	2	5	......	......	6	49
1902	13	2	65	7	30	19	27	7	......	2	......	3	175
1903	2	......	......	......	26	24	6	6	3	......	......	......	67
1904	1	......	......	7	50	20	7	13	......	4	......	5	107
Totals	44	98	130	81	169	206	225	69	30	23	5	18	1,098
Casquets lighthouse:													
1897	......	74	45	14	3	59	51	8	......	......	6	......	260
1898	7	3	......	4	5	32	35	37	8	......	......	......	131
1899	......	......	38	29	4	43	44	36	8	6	......	......	208
1900	1	1	......	2	18	30	41	6	6	......	......	......	105
1901	......	......	......	......	7	23	14	10	5	......	......	......	59
1902	......	5	52	12	25	24	29	12	3	......	......	1	163
1903	......	......	......	......	23	19	4	9	3	......	......	......	58
1904	......	3	......	4	49	25	9	12	1	1	1	......	105
Totals	8	86	135	65	134	255	227	130	34	7	7	1	1,089

In the Channel the percentage of thick weather (abstracted from the observations of ships, taken during the 30 years ended 1908) in October is less than 10 per cent; in January, August, September, November, and December it is above 10 per cent; in April it is above 20 per cent; in February, March, and May it is above 20 per cent in the western portion and above 30 per cent in the eastern portion; in June and July it is above 30 per cent in the western portion and above 40 per cent in the eastern portion.

Mirage is most frequent on the French coast, especially in the bight between Cape Barfleur and Cape d'Antifer; it is considered an indication of fine weather if it tends only to enlarge the apparent size of objects, but when it distorts and renders them difficult of recognition it is usually followed by rain or by strong easterly winds. When mirage is prevalent about sunset, it may be expected that as night draws on the Channel lights will become visible at much greater distances than under ordinary circumstances.

Depths (charted)—French tidal datum.—The soundings on French charts of the coast of France are reduced to the level of the lowest tide observed—that is, lower even than mean equinoctial springs.

The British Admiralty charts of the coast of France are founded on the French, and the same datum, termed by the French the zero of soundings, is adopted for them. The tidal rise is given from that datum; the spring rise is therefore greater than the spring range and not the same as it is on H. O. and B. A. charts of other coasts generally; it follows that the depths at low water, ordinary springs, are always greater than those shown on the charts.

As regards the Channel Islands, B. A. chart No. 62, Jersey, *a*, *b*, and *c*, follows the French system, while No. 262, *a*, *b*, and *c*, Guernsey, Herm, and Serk, follow the usual Admiralty method. The mariner should always consult the statement as to the datum of soundings on every chart, when no error can be possible.

The French tides are calculated from a quantity called l'Unité de Hauteur, which is the half range of the tide at mean equinoctial springs. No allusion to this, however, is made on the British Admiralty charts.

Soundings.—For all practical purposes the 100-fathom line may be considered as the edge of soundings, as beyond that depth in the entrance of the Channel the increase of depth is very rapid, and bottom is very rarely obtained in the ordinary course of navigation. The 100-fathom curve lies between 80 and 90 miles southwestward of Ushant, and it borders the western coast of France, from thence to the southward at the distance of about 90 miles. The edge of soundings may generally be recognized in fine weather by the numerous ripplings in its vicinity, and in boisterous weather by a turbulent sea and the sudden alteration in the color of the water from dark blue to a disturbed green.

The re-sounding in the approach to the vicinity of Ushant, conducted by officers of the French Navy in 1892, shows that the conformation of the bottom differs very considerably from that hitherto shown on the charts, founded on old surveys made in sailing vessels, in the neighborhood of Ushant, while the 100-fathom edge of soundings has proved to be somewhat more distant from the land than was supposed, some considerable inequalities in the bottom have been discovered, of which the most remarkable is a deep hole of 105 fathoms only 4 miles northwestward of that island.

The new soundings will be found of great service when using the lead in aid of navigation in thick weather; it must, however, be remarked that the inequalities in depth are generally too slight, and the changes in the nature of the bottom as now disclosed too insufficiently marked to render any exact determination of position by the lead possible.

Tides.—The tides on the continental shore of the English Channel are somewhat different from those on the island side, as the undulation travels with greater regularity and is of much greater height; but they possess certain points of similarity, in that there are two positions where tidal range is at a maximum, with another between with low range, and the minimum on the French coast is situated opposite that on the English coast (viz, at Omonville, opposite St. Albans Head), through the spring range at the former, 15 feet, is about three times the range of the latter.

Eastward of the position of minimum range there is on both coasts a water stand at high water of about 2 hours at Southampton on the English side and of nearly 3 hours at Havre on the French side.

The range, at springs, on the French coast reaches nearly 40 feet in the Gulf of St. Malo and 28½ feet at Cayeux at the entrance of the Somme, and the time occupied by the rising tide is 5¼ hours and by the falling tide 7¼ hours.

It has not yet been accurately ascertained what proportion the range of the tides in the fairway of the Channel bears to the range on the nearest coasts. It is probably somewhat less, but it will be in nearly all cases safe to allow a range corresponding to the range on the coast when reducing the soundings actually obtained by a ship in order to compare them with the soundings shown on the chart when eastward of Cape Gris Nez.

Tidal streams.—The general subject of Channel tidal streams is fully considered in British Islands Pilot, Volume I, page 5, but the streams being so much stronger and more variable on the French coast than on the English, a few further observations and even some repetition may not be out of place here.

There is generally on the French, as on other coasts, an indraft into all bays and bights, notably so into those of St. Malo, the Seine, and the Somme, and the streams as a rule turn from one to two hours earlier inshore than at a few miles in the offing. Full descriptions of all inshore and local streams will be found accompanying the descriptions of the various localities. *See* "Tidal streams" in the Index.

A general knowledge of the streams is more easily acquired when they are described within certain defined limits and under well-known names, as the Channel Stream, the North Sea Stream, or the Intermediate Stream, and the whole referred to the state of the tide at Dover as the standard. The Channel Stream occupies the area between the western end of Dover Strait and a line joining the Start and Casquets; the southern North Sea Stream, that between the eastern end of Dover Strait and a line joining the estuary of the Lynn and the Texel; and Dover Strait, for tidal purposes, may be defined as the space contained between a line joining Beachy Head to Point d'Ailly or the river Somme on the western side, and the North Foreland to Dunkerque on the eastern side.

The Channel and North Sea Streams run in opposite directions at the same time, both setting toward Dover Strait while the water is rising at Dover, and away from it while the water is falling at Dover. These streams also run in opposite directions to the streams outside them, as presently explained, and at these outer meetings and separations they are ever varying in direction, according as the strength of the one prevails over the other, producing a rotatory motion with scarcely any interval of slack water.

It has been stated that the Channel and North Sea Streams meet and separate in Dover Strait. Within the limit of that strait, as defined, the stream, although first running with the Channel Stream and then with the North Sea Stream, does not slack with those streams, but remains running both at high and low water at Dover, at which times the Channel and North Sea Streams are at rest. The stream in Dover Strait is therefore known as the Intermediate Stream. The place of meet and separation of the Channel and North Sea Streams in Dover Strait is not stationary, but moves from west to east between the two lines of demarcation, both on the rising and falling tide, thus:

When the water at Dover begins to fall, the Channel and North Sea ebb streams have both made, and the line of separation is off Beachy Head at the western limit. As the fall continues this line creeps eastward; at two hours after high water it is off Hastings; by the fifth hour it is near the South Foreland; and by low water it has reached the eastern limit, the line from the North Foreland to Dunkerque. At this time the Channel and North Sea ebb streams, westward and eastward of Dover Strait, have ceased running, and it is slack water in their respective areas, but the intermediate stream is still running westward.

When the water at Dover begins to rise, the Channel and North Sea flood streams have both made, and set toward Dover Strait. The North Sea Stream consequently runs with the Intermediate Stream, while the Channel Stream meets it, and this opposition continues so long as the tide is rising at Dover. The point of meeting, like that of separation, is at first at the western limit, off Beachy Head; it occurs at the time of low water at Dover and gradually shifts eastward as the tide rises. The point of meeting four hours before high water is nearly the same as the point of separation two hours after high water, and so this point of junction moves eastward until, about the time of high water at Dover, it has reached the eastern limit, between the North Foreland and Dunkerque. The Channel and North Sea flood streams have then both ceased running, but the Intermediate Stream in Dover Strait is still running eastward.

Within the next hour the Channel and North Sea ebb streams have both made, so that now the Intermediate Stream falls in with the North Sea Stream and runs with it, while it separates from the Channel Stream, the separation, as before, commencing off Beachy Head and moving eastward.

Off the mouth of the channel westward of Scilly, and northward and westward of Ushant, the stream is constantly changing in direction, the general tendency being northward and eastward while the tide is falling at Dover, southward and westward while it is rising at that port. The changes in direction of stream in this wide area, in one tide of 12½ hours, make one complete circuit of the compass, revolving with the hands of a watch; thus, when it is low water at Dover the stream in this area is running eastward; during the rising tide at Dover it changes to southeastward, southward, and southwestward; and at high water at Dover it is running westward. With the falling tide at Dover the stream changes to northwestward, northward, and northeastward, until, by low water at Dover, its direction is again eastward. The maximum rate of these outer streams is 1½ knots, but that rate is very rarely reached, the usual rate being from 1 knot or less, at springs, to a quarter or half a knot at neaps, and there is a slight excess of northeastern stream over that to the southwestward.

In the space contained between a line joining Ushant to the Land's End and another from the Casquets to the Start, there is, as before mentioned, a mixed stream partaking of the joint directions of the channel and offing streams. Eastward of the latter line the stream follows the fairway of the channel, and, as has been already stated, carries a vessel toward Dover Strait whilst the tide is rising at Dover, and away from it whilst it is falling there.

The Gulf of St. Malo, from its high tides and strong tidal streams, exercises a powerful influence over the navigation of the channel in its immediate vicinity, and the seaman must be especially on his guard when drawing near this locality. With the tide falling at Dover, the stream sets sharply into this gulf on both sides of the channel islands, and the prevalence of westerly winds is said to increase its strength. With rising water at Dover it sets across and out of the gulf, the northeastern part of the stream sweeping through the Russel and other channels on either side of Guernsey toward and through the Race of Alderney at from 7 to 8 knots.

With a rising tide at Dover, the stream sets sharply round Cape Barfleur into the Baie de la Seine, curving more and more with the form of the bay until it finally takes the sweep of the shore. With the flood stream, the western half of the bay is partly in eddy, and the stream slacks in all that part nearly an hour before high water at Dover; while in the eastern half it runs about half an hour beyond the time of high water at Dover, so that when eastward of Havre a ship beating up channel may prolong the tide in her favor by standing close over toward the French coast.

Between Dieppe and Cape Gris Nez, however, at the beginning of a rising tide, great attention should be paid to the direction of the stream given in the table, as the streams hereabout meet and are turned down toward the French coast; therefore a ship which on the English side would at this time have a stream setting straight up channel, here encounters one upon her beam sweeping her down toward the entrance of the River Somme, and this doubtless has been the cause of some of the many disastrous wrecks which have occurred in this part of the channel.

As regards the maximum rate of the streams on the French coast, at springs, though these will be found in detail in the local descriptions, it may be stated roughly that in the immediate neighborhood of Ushant, and in the channels between it and the land, the stream runs in places as much as 6 or 7 knots; along the coast eastward and along the shores of the Gulf of St. Malo, 3 to 4½ knots, but as much as 5 knots immediately off headlands; 3 to 4 knots generally among the channel islands; 4 knots through the Déroute Channel, and 5 knots through the Russel Channels and also between Jersey and the Minquiers Rocks. Through the Swinge and in the Race of Alderney 7 to 8 knots is the ordinary rate. Between Cape de la Hague and Cape Barfleur, 3 to 4 knots, but as much as 6 knots immediately off both capes; it runs at from 2½ to 3 knots in the Baie de la Seine, with a very dangerous indraft toward the whole estuary of the River Seine, on the flood, when in its vicinity. From Cape d'Antifer to Cape Gris Nez it varies from 3 to 4 knots, but fully 4 knots when near the latter cape. From Cape Gris Nez eastward to and beyond Dunkerque, the rate is from 4½ to 3 knots. It will thus be seen that the strength of the streams generally on the French coast is nearly or quite double that experienced on the English side of the channel.

It has been ascertained that the whole volume of water in the Straits of Dover follows the usual tidal system; that is, the entire body of water from the bottom to the surface moves as a mass in the same direction, and that there is no underneath countercurrent, as in the Straits of Gibraltar.

Caution—Approach to Ushant Island.—Ushant Island being the limit of this work, the remarks on its approach belong more particularly to the sailing directions for the western coasts of France; but the importance of the subject makes it desirable to include them in this work, and they will be found further on.

The compass.—Too much attention can not be given to the compass, for it is only by constantly ascertaining its error by azimuths that a course can be shaped with accuracy. The value of such knowledge at all times, but especially when approaching narrow waters like the English Channel, must be apparent to the practiced navigator.

Magnetic variation.—The general direction of the lines of equal variation is south-southwest and north-northeast (true). Strict attention should be paid to the correction of course required by the continuous change in variation when proceeding up or down channel, especially if steaming or sailing at a high speed.

The difference in variation between Ushant and Dunkerque is 3°, the variation decreasing as a vessel proceeds eastward. The annual decrease of variation at present is about 6′.

Barometer.—The average range of the barometer in the higher latitudes, 50° to 60°, is about 1.5 inches, but on extraordinary occasions ranges of 2.75 and 3 inches have been recorded.

In the northern hemisphere the effect of the veering of the wind on the barometer is according to the following law:

With east, southeast, and southerly winds the barometer falls.

With southwesterly winds it ceases to fall and begins to rise.

With west, northwest, and northerly winds it rises

With northeasterly winds it ceases to rise and begins to fall.

And the law between the height of the barometer and the direction of the wind is in the northern hemisphere:

Stand with your face to the wind and the barometer will be lower on your right hand than on your left.

Thermometer.—The thermometer in the northern hemisphere rises with east, southeast, and southerly winds. With a southwesterly wind it ceases to rise and begins to fall. It falls with west, northwest, and northerly winds; with northeasterly winds it ceases to fall and begins to rise.

Port regulations, etc.—All French ports of importance are subject to port regulations, which are strictly enforced and to which ready attention and obedience should be shown. In some cases anchorage is forbidden within certain areas, and notices are published to that effect. Mariners visiting French ports should ascertain beforehand what late Notices to Mariners have been issued regarding prohibited anchorages, and should also make themselves generally acquainted with the French system of signals, beaconage, buoyage, etc.

Admission of foreign war vessels to French territorial waters and ports in time of peace.—1. The term "war vessel" is herein considered to apply to all vessels designated as such in the accepted meaning of this term, as well as to auxiliary vessels of every description.

2. For the purposes of the present regulations:

(*a*) The French littoral is divided into sections, the limits of which are as follows: Channel section, from the Belgian frontier to Primel Point; Atlantic section, from Primel Point to the Spanish frontier; Mediterranean section, from the Spanish frontier to the Italian frontier (including Corsica).

(*b*) Tunisia, Algeria, and the Moroccan Protectorate form a single section.

3. In peace time foreign war vessels are permanently authorized to visit French ports and those of protectorates, and to anchor in terri-

torial waters, on condition that the number of such vessels flying the same flag does not exceed three per section.

In considering the number of vessels which can be admitted into a section at the same time, vessels already in that section will be taken into account.

The notification of a projected visit should, however, always be transmitted through the usual diplomatic channel so as to arrive, if circumstances permit, at least seven days before the date of the projected visit.

Foreign war vessels may not stay more than 15 days in ports and territorial waters. They will be required to put to sea in six hours if requested to do so by the naval authorities or by the "commandant d'armes," even if the prescribed term of stay has not expired.

4. A special authorization from the Government of the Republic, obtained through the usual diplomatic channel, is necessary both in order to prolong the duration of the visit and to exceed the number of vessels admitted specified in article 3.

5. The regulations given in articles 3 and 4 do not apply:

(*a*) To ships of war and vessels on board of which are embarked heads of States, members of reigning dynasties or their suites, or diplomatic representatives accredited to the Government of the Republic.

(*b*) To war vessels compelled to put into port by reason of damage sustained, bad weather, or other unforeseen causes.

(*c*) To vessels engaged in the superintendence of fisheries, in accordance with the conventions relating to these fisheries.

6. In ports which are chief naval ports of arrondissements of the headquarters of a senior naval officer the right of assigning anchorage berths to foreign war vessels or of directing them to shift berth, if necessary, is vested solely in the prefet maritime or senior naval officer (commandant de la marine).

At all other ports this right is vested in the captain of the port.

7. Upon entering a port foreign war vessels will be boarded by a naval officer, sent by the prefet maritime or senior naval officer, or by a port official sent by the captain of the port, who will offer the commanding officer the courtesy of the port.

The officer will acquaint the commanding officer with the anchoring berth that has been allotted to his ship and will obtain information as to the object and proposed duration of the visit, the name of the commanding officer, and the information it is usual to obtain upon such occasions.

Should the officer sent to welcome the foreign war vessel arrive on board after she has already anchored or made fast, the prescribed communication and inquiry will nevertheless be made, and the confirmation of the anchoring berth taken or the assignation of another will also be carried out.

At anchorages where there is no captain of the port, if no French war vessel is present, the foreign war vessel will be boarded by a customs official.

8. Foreign war vessels calling at a port or in territorial waters are required to respect the fiscal laws and the laws and regulations regarding sanitation.

They are also required to adhere to all port regulations to which vessels of the French Navy are subject.

With this object, the local naval authority will furnish the commanding officer with all necessary information concerning the port regulations.

Foreign war vessels within territorial waters are forbidden to take bearings of the land or soundings or to carry out, without permission, landing or firing exercises.

No submarine work, executed with or without divers, is to be undertaken without previous notice to the naval authorities.

Men belonging to ships' companies and troops must be unarmed when landed. Officers and petty officers (or N. C. O.'s) may carry the side arms which form part of their uniform.

The number of liberty men to be landed, the time of landing and return on board, will be fixed by arrangement with the local civil authorities and the commandant d'armes.

Boats moving in ports and territorial waters may not be armed.

The death sentence may not be carried out by any foreign war vessel in territorial waters.

If a funeral is to take place on shore and the commanding officer desires an armed party to accompany the procession, he must obtain the permission of the commandant d'armes.

9. The regulations for the admission of belligerent foreign war vessels are set forth in the decree of the 18th October, 1912, but remains subject to the formalities of notification or previous authorization specified in articles 3 and 4 of the present decree. except in cases of force majeure provided for in paragraph (*b*) of article 5.

10. Should a foreign war vessel fail to comply with the regulations set forth in this decree, the local naval or military authority will first call the attention of her commanding officer to the infringement committed, and formally request him to observe the regulations.

Should this course fail, the qualified authority, prefet maritime, senior naval officer, or commandant d'armes, may request the foreign war vessel to leave the port or territorial waters immediately.

Regulations for approaching French territorial waters in time of war.—1. In time of war the visits of ships other than

French war vessels, to anchorages and ports on the French littoral or in French protectorates, are governed by the regulations given below.

2. No French merchant vessel, nor foreign vessel, either war or merchant, may approach within 3 miles of the coast in French territorial waters or of French protectorates without permission without running the risk of being destroyed.

3. Between sunrise and sunset, every vessel affected by the present decree is to fly her national flag and number by international code (if she has one) as soon as she approaches the forbidden zone. If desirous of entering the latter, a request is made by hoisting the pilot signal, the ship remaining outside the zone until authorized to enter by semaphore, the signal station, or examination vessel.

The reply from a semaphore or signal station is made in the international code by the following signs:

S. flag.—Entry permitted.
D. pendant.—Entry deferred.
Q. flag.—Entry forbidden.

If permission to enter is given, a ship is to steam at reduced speed in the forbidden zone, keeping the signal for a pilot flying.

If entry is deferred, a ship is to maneuver so as to clear the entrance to the channels and await the examination vessel, steaming toward the latter at reduced speed when seen.

If entry is forbidden, a ship is to abandon the idea of entering and make for another anchorage.

The examination vessel is distinguished by three balls on the same halyard.

4. Between sunset and sunrise every vessel affected by the present decree is to fly her national flag and have navigation lights lit on approaching the forbidden zone. If desirous of entering the latter, a request is made by burning one or more Bengal lights and blowing blasts on the whistle or siren, the ship remaining outside the zone until permission to enter has been granted by an examination vessel.

The ship, with her navigation lights showing, will await the examination vessel, and continue to burn Bengal lights to attract attention, and if not warned, on sighting the examination vessel, may steam toward her at reduced speed.

The examination vessel is distinguished by three red lights superimposed.

A red Coston light exhibited from a station on shore signifies that entry is forbidden; a ship must then give up the idea of entering and make for another anchorage.

Between sunset and sunrise every vessel affected by the present decree is in principle forbidden to request entry into the zones off the naval bases of operations—Cherbourg, Brest, Toulon, Bizerta—the only cases in which captains can request permission to enter are the following:

Vessels authorized to do so by the governor either on their departure or while en route.

Vessels in danger and absolutely incapable of remaining at sea until daybreak or of reaching another anchorage.

5. In foggy weather every vessel affected by the present decree desirous of entering the forbidden zone is to hoist the same signals as in clear weather and blow blasts on the whistle or siren until permission to enter has been given by an examination vessel.

Entry into the naval bases of operations—Cherbourg, Brest, Toulon, Bizerta—is forbidden in foggy weather under the conditions specified in article 4.

6. Every vessel affected by the present decree must immediately comply with the orders of a war vessel or examination vessel, semaphore or signal station given by voice, international signal code, or by warning gun.

Every ship warned by a battery or war vessel, whatever her distance from shore may be, is to immediately stop. When stopped a ship may renew her request to enter, but must await where she is orders which will be notified.

If, in spite of the warning given by the firing of a blank charge, a ship does not stop at once, a premonitory shot will be fired two minutes later, and if after the expiration of a further two minutes' interval the vessel is still under way, effective fire will be opened upon her.

In cases of emergency the blank charge may be omitted.

At night the warning gun may also be omitted, and every ship entering the forbidden zone without permission is liable to be destroyed without preliminary warning.

7. Vessels authorized to enter the roadsteads and ports of France and her protectorates are to take up the berths indicated by the local authority and conform strictly to the regulations of every nature issued by that authority.

The length of stay of a ship will depend on military considerations, and when circumstances require it a ship may be ordered to put to sea or to move to a determined point. Such order must be carried out without delay, though respite may be allowed to ships really unable to conform to it immediately.

No vessel is to get under way, either to change berth or to quit the roads, without the permission of the local authority; a request may be made by signal, S. flag.

8. In naval roads and ports, between sunset and sunrise, the movement of boats, other than those of war vessels, is absolutely forbidden.

From sunrise to sunset, movement is only allowed to boats which have received a special permit from the naval authorities and the means of making themselves recognizable.

Boats with permits should steer clear of war vessels if ordered to do so, and can not in any case go alongside the latter without their permission. The movement of these boats will, moreover, remain subject to local regulations, notably those relative to the prohibition to enter certain parts of the roadstead, and to go alongside at any other place than those expressly notified.

In commercial ports similar measures will be taken by the local authority to impose the restrictions judged necessary on the movement of boats, due consideration being given to the interests of commerce.

9. Visits by neutral war vessels are governed by the decree of May 21, 1913, so far as notification or previous authorization is concerned, the regulations for entry being governed by the present decree.

10. The measures provided for by the present decree are to come into force on mobilization or on special notice.

11. Any infraction of the present decree will lead to such repressive measures as circumstances admit of, in addition to the risks of destruction incurred.

12. Regulations contrary to the present decree are canceled.

13. The minister of marine is charged with the execution of the present decree.

Regulations for temporarily closing access to French ports on account of naval maneuvers, exercises, etc.—Access to French ports may be prohibited, or subjected to certain regulations, on account of naval maneuvers, exercises, or any other cause. In these circumstances—

1. A warning signal will be made from a conspicuous point, thus: By day, three balls placed vertically; at night, three red lights placed vertically.

2. The same signal will be exhibited by the watch vessels.

3. Any vessel wishing to enter or to leave French waters, when one of these signals is flying, should by day hoist the pilot signal and await the arrival of a watch vessel, and at night burn one or more Bengal lights as well as give blasts of the siren or whistle and await the arrival of a watch vessel.

4. On a hail or a warning gun being fired from the watch vessel, every vessel should immediately stop or heave to.

5. Vessels have then to submit to a visit, and the watch vessel will give the following information:

(*a*) If a special visiting service is established and where it is situated.

(*b*) If the entrance to the port is closed, and for how long.

(*c*) If there are special instructions for navigation in a certain area.

6. For vessels leaving the port, the necessary instructions will be given. or they will be visited by the maritime authorities.

7. Captains who infringe the above instructions will do so at their risk and peril, and will have to repair any damages they may have caused.

Lights.—On the coast of France fixed lights of the catoptric character (or by reflectors), said to be visible through a limited arc, may from the distance of about one-third their given range of visibility, sometimes be seen 55° to 60° on each side of the center of such arc. The greatest power of these lights is in the axis of the sector. The limits of all sectors and details of a light's characteristics will be found in the Light List.

In ports and channels the colors are arranged, as far as possible, so that a vessel entering leaves the green lights on the starboard and red lights cn the port hand. Sometimes one of these colors is replaced by white, which has a greater range.

Two contiguous sectors of the same light are never separated by an absolutely definite line, but between them there is an angle of indecision; vessels should not navigate in this angle, but should enter the sector clear of danger and verify the position by a bearing of the light.

Lightvessels.—The lightvessels on the coast of France are distinguished by their color and the conspicuous mark they carry at the masthead. They generally bear the name of the station they occupy. Lightvessels out of position discontinue their characteristic lights and exhibit the International Code, "Not under control" signal, both day and night. Lightvessels not sounding an established particular fog signal during thick or foggy weather ring the ship's bell rapidly for about five seconds, at intervals not exceeding one minute, in conformity with the rules prescribed for ships at anchor. Seek details in Light List.

French lightvessels do not carry riding lights. They can communicate by the International Code of signals.

Unwatched lights and lightbuoys.—Lights shown from buoys and from lighthouses without keepers can not be implicitly relied on, as if occulting the apparatus may get out of order or the light may be altogether extinguished. Sometimes the visibility of these lights is diminished by the deposit of salt, which, brought by the spray, covers the glasses of the apparatus.

Storm signals are made at the semaphore stations and port offices on the coasts of France, and remain hoisted 48 hours from the time of receiving notice from the ministry of marine.

Signal.	Signification.
A cone, points upwards	Gale probable from northwestward.
Two cones, points upward	Gale probable from northeastward.
A cone, point downward	Gale probable from southwestward.
Two cones, points downward	Gale probable from southeastward.
Two cones, bases together	Gale of hurricane force probable.

Meaning of signal.—Any of these signals indicate that there is an atmospherical disturbance in existence, which will probably cause a gale from the quarter indicated by the signal used within a distance of about 50 miles of the place where the signal is hoisted, and the knowledge of which is likely to be of use to seamen. Its meaning is simply Look out! Bad weather as indicated is probably approaching you.

Weather signals.—The following signals are hoisted at French semaphore stations and port offices for half an hour in the morning and evening, and indicate the weather existing at sea:

1. A flag, of any color, indicates: Weather doubtful; barometer inclined to fall.
2. A short pendant indicates: Appearance of bad weather, heavy sea; barometer falling.
3. A pendant indicates: Appearance of better weather; barometer rising.
4. A flag above short pendant indicates: Entry into the port is dangerous.
5. A flag below short pendant indicates: The lifeboat is going out.

In fine settled weather no signal is made.

Eiffel Tower radio weather signal.—The following procedure is employed for the meteorological message dispatched by the Eiffel Tower station:

1. The message is transmitted every morning at 11 a. m. Greenwich mean time immediately after the time signal.
2. It gives the barometric pressure, the direction and force of the wind, and the state of the sea as recorded at 7 a. m. on the morning of the same day at Reykjavik (Iceland), Valentia (Ireland), Ushant (France), Coruna (Spain), and Horta (Azores), and as recorded at 8 p. m. of the day previous at St. Pierre-Miquelon (America).
3. The stations are indicated by their initial letter, thus: R, V, O, C, H, S.
4. The two first figures of each group indicate in millimeters the atmospheric pressure (the hundreds (700) being suppressed).
5. The third and fourth figures indicate the direction of the wind, north being 32; east, 08; south, 16; west, 24; thus, 02 indicates north-northeast, 23 indicates west by south, etc.

6. The fifth figure indicates the force of the wind from 0 (calm) to 9 (hurricane).

7. The sixth figure indicates the state of the sea from 0 (calm) to 9 (tempestuous). The state of the sea is not given in the reports of Reykjavik and St. Pierre-Miquelon, so the groups corresponding to these two stations consist of only five figures.

8. At the end of the sixth group will be given in plain language some indication of the general European conditions prevailing, and more particularly the positions of high or low pressures.

9. Each dispatch will be preceded by the letters B. C. M., showing that it emanates from the Bureau Centrale Météorologique.

10. Example: B. C. M., R. 48167, V. 742013, O. 753211, C. 680411, H. 739901, S. 62162, anticyclone Europe centrale beau temps general depression ouest Islande allant vers Est.

This would indicate: R(eykjavik), 48 (pressure 748), 16 (wind south), 7 (very strong); V(alentia), 74 (pressure 774), 20 (wind S. W.), 1 (nearly calm), 3 (slight sea), etc.

Radio time signal.—The following radio time signal is made at Eiffel Tower, Paris: At 11 h. 43 m. 00 s. G. M. T. and at 22 h. 43 m. 00 s. G. M. T.: Signal Observatoire de Paris.

First preparative signal: A series of dashes from 11 h. 44 m. 00 s. to 11 h. 44 m. 57 s. and from 22 h. 44 m. 00 s. to 22 h. 44 m. 57 s. G. M. T.

First time signal: A dot at 11 h. 45 m. and at 22 h. 45 m. 00 s.

Second preparative signal: A series of dashes followed by two dots, from 11 h. 46 m. 00 s. to 11 h. 46 m. 57 s. and from 22 h. 46 m. 00 s. to 22 h. 46 m. 57 s. G. M. T.

Second time signal: A dot at 11 h. 47 m. 00 s. and 22 h. 47 m. 00 s.

Third preparative signal: A series of dashes followed by four dots, from 11 h. 48 m. 00 s. to 11 h. 48 m. 57 s. and from 22 h. 48 m. 00 s. to 22 h. 48 m. 57 s.

Third time signal: A dot at 11 h. 49 m. 00 s. and at 22 h. 49 m. 00 s. G. M. T.

Each time signal is of about ¼ second duration, the beginning of the signal being the time.

Fog signals.—On certain points of the coast of France sound signals are established to warn mariners of the proximity of land or of danger. Some, such as those associated with lighthouses showing an electric light, are produced by sirens, worked by compressed air, and can be put in action immediately the keeper preceives the formation of a fog. Others worked directly by steam require a certain time, after it is considered necessary to use the signal, before it can be made; there are also bells, trumpets, and whistle buoys. Light vessels generally use bells. For details of characteristic see Light List.

Caution.—Very often fog banks exist which do not extend to the land, and it is impossible to know of their existence from the signal station, and also large areas of silence may exist in different directions and at different distances from a fog signal; besides, under certain atmospheric conditions, the audible distance of the most powerful fog signal is less than 2 miles, and on hearing a signal neither its distance nor its direction can be determined exactly. Mariners are therefore cautioned that when approaching land in a fog the fog signals should not be relied on, but the lead should always be used, which in nearly every case gives sufficient warning to avert danger.

Signals can sometimes be heard from aloft when inaudible from the deck.

Semaphores.—Semaphore stations are very generally established on the principal points and headlands of the French coast; they are connected with the general telegraphic system, and all vessels can communicate by the International Code either with the marine authorities or with commercial houses, and the messages are forwarded by telegraph.

Should a shipping disaster occur in the neighborhood of a signal station the folowing signals will be hoisted: A black flag at the masthead indicates that it is in the immediate vicinity of the station; a black flag at the gaff, that it is to the right (looking from seaward) of the station; a black flag at the yardarm, that it is to the left (looking from seaward) of the station. Guns may also be fired every five minutes to attract attention.

Regulations and signals relative to French submarines.—I. General regulations.

1. When meeting other vessels, and except in the case hereinafter mentioned (when flying the submerged flag), submarines navigating on the surface must conform with the usual rules of the road.

When, on the contrary, submarines are navigating submerged, all other vessels should give them a wide berth.

2. The presence of submarines submerged is indicated by a square flag with one yellow and one red horizontal stripe, hoisted at any signal station, lighthouse, fort, etc., in sight of which the submarines are maneuvering, or by a vessel, torpedo boat, or tug accompanying them.

3. When a vessel is navigating in a neighborhood where submarines are signaled submerged, the master must station special lookouts to watch the surface of the sea and report all floating objects.

The periscopes (optical tubes of submarines) are distinguished from other objects usually met with, in that they appear like a round post standing vertically out of the water.

4. Although submerged submarines may be met in all French waters, masters of vessels should be particularly on the lookout for them in the neighborhood of Calais and Cherbourg, where submarine flotillas are stationed.

5. In order to give every convenience to vessels making or leaving the ports frequented by submarines, zones have been fixed which are prohibited to submerged submarines. Masters frequenting these ports are earnestly requested to navigate in these zones.[1]

II. Regulations and signals relative to submerged submarines.

1. The signal stations hoist the flag (one red and one yellow horizontal stripe) to warn vessels near the coast that submarines are submerged in the neighborhood.

2. Every vessel convoying a submerged submarine carries as distinctive signal the aforesaid flag forward, and a white ball aft in place of the national ensign.

Every vessel observing these signals should steer to pass at least half a mile astern of the convoying vessel.

3. During submerged maneuvers the submarines carry forward the red and yellow flag, and aft the national ensign.

Every vessel observing these signals should give a wide berth to the submarine, which, even should she be momentarily on the surface, is to be considered as exempt from the rules of the road.

III. Regulations relative to firing torpedoes from submerged submarines.

1. The target vessels, or vessels towing a target for submerged submarine torpedo practice, carry during the firing exercises, besides the ordinary large red firing flag, a large flag (one red and one yellow horizontal stripe) hoisted in a clearly visible position.

2. Vessels should give the route of the target a wide berth, passing at least half a mile from it.

3. When the target or towing vessel sees a vessel standing on a course dangerous to the submarines it may hoist international code M N (stop immediately), and fire a gun if necessary.

The vessel signaled should immediately obey this signal.

The signal M H will intimate that she can continue her course.

The vessels convoying submarines may also, in case of emergency, make use of these signals.

4. When possible the target vessel is accompanied by a swift dispatch boat, ready to convey to vessels in sight any order by voice or by aid of a blackboard.

IV. Regulations and signals relative to the protection of submarines at moorings.

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[1] These zones are fully described in the appropriate pages of this volume.

1. All vessels and boats are forbidden to go alongside submarines anchored or moored in ports or roadsteads without a special permit.

2. By night the submarines anchored or moored in ports or roadsteads carry, in addition to the ordinary anchor lights, three lights vertical (two red above one white), and distant 6 feet apart.

Caution respecting English submarine vessels.—Submarine vessels are being constantly exercised off the coasts of Great Britain.

In order to minimize the risk of collision with other vessels the vessel escorting the submarines will, when the latter are exercising, display a large red flag at the masthead.

Every vessel seeing this signal should steer so as to give the escorting vessel a berth of at least 1 mile, and also to pass astern of her; when from any cause this can not be done, the escorting vessel should be approached at a slow speed until warning is given by flags, semaphore, or megaphone, as most convenient, of the danger zone, a good lookout being kept meanwhile for the submarines, whose presence may be only indicated by their periscopes showing above water.

Caution respecting sweeping operations, in which H. B. M. vessels are frequently engaged off ports of Great Britain.

While so employed they work in pairs connected by a wire hawser; they are, consequently, hampered in their maneuvering powers.

To indicate the nature of the work in which these vessels are engaged they will show the following signals:

A black ball at the foremast head and a similar ball at the yardarm or where it will best be seen on that side on which it is dangerous for a vessel to pass.

For mutual safety, other vessels, whether steamers or sailing craft, should endeavor, without violating the rule of the road, to keep out of the way of vessels flying this signal; they should especially remember that it is dangerous to pass between the vessels of a pair.

French tidal signals.—Tidal signals made at the ports and harbors on the coast of France, universally indicate the height of the tide, either above the level to which the soundings are reduced, that is the lowest possible tide, when the number of feet indicated by the signal added to the soundings shown on the chart give the depth at that time, or above some fixed mark, the relation of which to the lowest possible tide level has been determined.

By day these signals are made from a mast with a yard by means of a black pendant and a white flag with a black diagonal cross to indicate the state of the tide, and by black balls to indicate its height, as follows:

1. The pendant above the flag indicates rising tide.
2. The pendant below the flag indicates falling tide.

No flag or pendant is shown at high or low water.

3. A ball at the left yardarm, as seen from seaward, indicates a height of about 9¾ inches above the soundings or fixed mark.

4. A ball at the right yardarm, as seen from seaward, indicates a height of 1⅔ feet above the soundings or fixed mark.

5. A ball at each yardarm indicates a height of 2½ feet above the soundings or fixed mark.

6. A ball, placed on the mast, below the yard, indicates a height of 3¼ feet above the soundings or fixed mark.

7. A ball, placed on the mast, above the yard, indicates a height of 6½ feet above the soundings or fixed mark.

8. A ball, placed at the intersection of the mast and yard, indicates a height of 9¾ feet above the soundings or fixed mark.

9. Heights above 9¾ feet are given by combinations of the above signals, as shown in the following table:

The signals are not made in complete detail at all ports, but any signal has everywhere the same meaning. Every half meter or every meter of rise only may be signaled, or heights of 1, 2, or 3 meters, or one only of those three, indicated with one ball. In some ports flag and pendant only, without a ball are used, and indicate the time during which the sea level is above some fixed mark.

By night the signals are arranged to suit the requirements of each particular port, and are made known to mariners by special notice.

Tide gauges.—Tide gauges are placed on jetty heads and certain masonry beacons for the navigator to consult when entering French harbors or channels requiring, in order to be practicable, a certain height of tide. The gauges are marked in paint, and graduated from the low water soundings of the chart; they can also be formed by movable panels fixed on the masonry work. When placed on a jetty head or on a single color masonry beacon, red or white, the graduation is effected by horizontal lines 3 inches in breadth, the lower edge of which marks the height; the divisions are 1 meter apart, and the lines and figures which indicate the height are painted white. When the tide scale is placed on a masonry beacon colored in alternate bands, each of these bands in half a meter in breadth, and the figure which indicates the height is placed on the band immediately over the line of separation in color which marks the rise of the tide above the chart soundings. The tide gauges are only marked at the level at which keeping up painting is possible, and the indications on the scale are practically useful.

Signals prohibiting entry.—A uniform system of signals has been established to indicate when vessels are prohibited from entering or leaving French ports. This system comprises only three signals, viz, "Entry to the port is prohibited," "Leaving the port is prohibited," and "It is prohibited either to enter or leave the port."

Supplementary signals, applicable to the special circumstances of each port, will continue to be made.

The three signals above mentioned are made, according to the installation provided at the port, by means of one or other of the two series of signals, as shown on the accompanying tabular form.

Series.	Day.	Night.
Series A:		
Entrance prohibited	Horizontal arm with a disk at the end generally pointing toward the fairway.	Three red lights vertical.
Vessels prohibited from leaving the port.	Three hexagonal shapes or disks placed vertically.	Three green lights vertical.
Vessels prohibited from either entering or leaving the port.	Horizontal arm with a disk at the end generally pointing toward the fairway and two hexagonal shapes or disks placed vertically.	Three lights placed vertically, a green between two red.
Series B:		
Entrance prohibited	A red flag	A red light.
Vessels prohibited from leaving the port.	A green flag	A green light.
Vessels prohibited from either entering or leaving the port.	A red flag above a green flag.	A red light above a green light.

Searchlights.—Any vessel so inconvenienced as to interfere with safe navigation by searchlights which are being exercised at defended ports, or by ships of war, both in the United Kingdom and in France, Algeria, and French colonies, should make use, either separately, or preferably in combination, of the following signals:

(*a*) By flashing lamp, four short flashes followed by one long flash.

(*b*) By whistle, siren, or foghorn, four short blasts followed by one long blast.

On these signals being made, the incommoding searchlight will be either doused, raised, or its direction altered. The signals should not be resorted to without real necessity, as, unless the vessel is actually located in the rays of a particular searchlight, it is impossible to know which searchlight is affected. The signal should be repeated until the searchlight has been doused or its direction altered.

These signals are designed to assist mariners, and vessels failing to make use of them will be held responsible for accidents that may result.

Pilotage.—Steamers of and above 100 tons, and sailing vessels of and above 80 tons, must take a pilot to enter or leave French ports, and also to shift berth if the distance to be moved is a cable or above. In some ports vessels drawing 7½ feet and over must take a pilot, whatever may be the tonnage. If a vessel enters or quits a port without a pilot, the pilotage fee has nevertheless to be paid.

The master of a vessel liable to pilotage should, on approaching a port, road, or river, hoist the pilot signal, keeping it flying until the arrival of a pilot having the right to pilot him, or until the vessel is clear of dangers. The first duly licensed pilot offering himself has to be received, and if for any reason a second pilot should be received and employed both have to be paid. Should a local fisherman or boatman be taken in the absence of a pilot, the pilot signal should be kept hoisted; and on a licensed pilot presenting himself he must be given pilotage charge. Every facility must be given to pilots in boarding vessels.

The stations in which pilots have the right of pilotage are generally of small extent; when they pilot a vessel outside these limits the pilot signal should be hoisted for the pilot of the station the vessel enters, who will take charge on boarding.

Generally every steamer pays half the pilotage charges fixed for a sailing vessel; in case of towing, both vessels must take a pilot, and a vessel towed pays the pilotage charges of a steamer.

Note.—Special attention is called to the fact that orders from French pilots differ in meaning from those given by English pilots.

The pilotage district of Havre extends from a line westward joining Scilly Isles and Ushant to a line eastward joining the South Foreland and Cape Gris Nez.

Pilot signals.—French pilot boats have an anchor, painted in black or white on each sail and on each side of the rail, with also the initial of the name of the station and the registered number of the boat. Generally the hull is painted black with a white band below the gunwale.

During the day, and so long as there is a pilot on board, a blue flag bordered with white (flag S of the International Code) is hoisted at the main masthead. At night, under similar circumstances, the pilot boat carries at the masthead a white light, visible round the horizon, and in addition, at short intervals, exhibits a white light or flare on deck.

She should have her side lights lighted but covered, so as to be able to show them to indicate the direction of her head when approaching other vessels.

Pilot boats which can board vessels to put a pilot on board may show the white light instead of carrying it at the masthead, and instead of side lights may have at hand a lantern furnished with green glass on one side and red glass on the other, to use as above.

A vessel requiring a pilot should, by day, hoist a blue flag with a white border (flag S of the International Code), or her national flag, bordered with white, at the foremast head. At night, both at sea or at anchor, she should show a white light above the bulwarks, and hide it several times at intervals of 15 seconds; this signal should be accompanied, if necessary, by blue lights at intervals of at least 15 minutes.

A pilot boat proceeding to a vessel in answer to the signal, shows a white light or flare at intervals of 15 seconds.

When pilots are unable from bad weather to go out to sea, vessels may be guided by special signals.

Fenoux mast.—The Fenoux pilot mast is intended to facilitate the entry of vessels into French ports when bad weather prevents pilots going on board. It consists of a mast, at the head of which is an arm movable on its center, one side of which is a triangle and the other an arrow; at rest the arm is vertical with the triangle down.

A ship from seaward, requiring the aid of the pilot mast, hoists her national flag at one of her mastheads, and the pilot answers by placing the arm vertically with the triangle up; then he points the triangle horizontally toward the direction to which the vessel should steer to the entrance of the port.

The triangle is then inclined right or left to the direction toward which the vessel should steer and is placed vertically upward while she is going well.

When the pilot sees that the vessel has cleared the dangers and has no further need of his aid, he places the arm at rest.

If several vessels present themselves to enter a port, the pilot directs the one which is in position to enter first, then each of the others, always in the same order; but if circumstances do not permit waiting to enter separately, they steer in the wake of the vessel directed by the pilot mast, keeping near enough each other to follow exactly the movements of the first.

If the pilot considers that the vessel in sight is not able to enter on account of the state of the tide, he places the arm horizontal and hoists a ball at the end of the arrow. The vessel then waits till the arm is inclined right or left, indicating the direction for her proceed.

If the pilot estimates that a vessel which asks to enter is not able to do so without danger, he places the arm vertical with the arrow upward and hoists a ball at the end of the arrow; but if on account of damage the vessel must attempt to enter even at the risk of being wrecked, she should make one of the usual signals of distress.

The pilot then directs the vessel by the signals indicated above, either to cross the bar or to anchor in the road. If he considers it necessary to run the vessel ashore, he warns the vessel by hoisting a red flag at the pilot mast and directs her to the least dangerous place; but if any circumstance happens which gives the pilot hope of saving the vessel, he lowers the red flag and directs the vessel as he considers necessary.

A vessel in danger from her anchors dragging should make a signal of distress, which the pilot answers by placing the arm vertical with the triangle upward. He then directs the vessel, and hoists the red flag if he considers it necessary to place her onshore.

If the pilot considers that a vessel should shift her anchorage, he places the arm vertical with the triangle upward, and maintains this signal until the vessel hoists her national flag at the masthead in answer. The pilot then directs her movements, and the vessel anchors when the arm is placed vertical with the triangle down.

French uniform system of buoyage.—The following system of buoyage is established on the French coast. It comprises all marks, fixed or floating, which serve to indicate, by day, either existing dangers or the limits of navigable channels, namely, buoys, beacons, beacon towers or turrets, jetty heads, rocks, and convenient natural objects. It does not include ordinary landmarks and mooring buoys: mooring and warping buoys are painted white.

The term starboard means the right-hand side approaching from seaward; the term port means the left-hand side. The term separation marks is given to the marks placed at the seaward extreme of middle grounds, and the term junction marks is given to the marks placed at the inshore extremes of middle grounds. Marks placed on shoals of small extent are named isolated danger marks.

1. Starboard-hand marks are painted red, and surmounted by a top mark of conical shape; if necessary, they are numbered with even numbers commencing from seaward.
2. Port-hand marks are painted black, and surmounted by a top mark of cylindrical shape; if necessary, they are numbered with uneven numbers commencing from seaward.
3. Separation marks are painted white and black in horizontal stripes, and surmounted by a top mark formed of two cones, bases together.
4. Junction marks are painted white and red in horizontal stripes, and surmounted by a top mark formed of two cones, points together.
5. Isolated danger marks are painted red and black in horizontal stripes, and surmounted by a spherical top mark.
6. Wreck marks, whether buoys or vessels, are painted green, and surmounted by a top mark of the shape mentioned in the preceding articles 1, 2, 3, 4, and 5, according to the case; and lights are used according to circumstances.
7. Names or numbers on marks are painted white.

Naval dockyards.—There is a Government naval dockyard and establishment at Cherbourg.

Docks.—There are Government dry docks at Calais, Cherbourg, Dieppe, and Dunkerque. Also private dry docks at Cherbourg, Granville, Havre, Paimpol, St. Helier (Jersey), and St. Malo.

Gridirons at Boulogne, Calais, Dieppe, Dunkerque, Fecamp, Granville, Gravelines, Honfleur, St. Malo, St. Servan, St. Valery sur - Somme, and Trouville.

Patent slips at Dunkerque, Guernsey, Rouen, and St. Valery en Caux; also heaving-down slips or pontoons at Cherbourg, Corseulles, Granville, Havre, Honfluer, Legue or St. Brieuc, and St. Malo.

The dimensions and capabilities of the above will be found in the description of the several ports, and also in the dock book.

Uniform system of time.—France has adopted the standard meridian of Greenwich, or G. M. T.

Coal can be obtained without difficulty and at moderate prices at all the principal ports. For further particulars, see places in index.

Communication—Caution.—The large steamers of the Compagnie Générale Transatlantique start from the docks of Havre for New York. German trans-Atlantic steamers call at Dieppe and Cherbourg both outward and homeward bound. Many lines of steamers, some of very high speed, cross the channel between French and English ports, namely, between the French coast Channel Islands and Southampton, Cherbourg and Southampton, Havre and Southampton, Caen and Newhaven, Honfleur and Newhaven, Dieppe and Newhaven, Boulogne and Folkestone, Calais and Dover, etc. This ever-increasing cross-channel traffic creates a source of considerable danger of collision to vessels bound up or down channel, especially in thick or foggy weather, and at all times calls for the utmost vigilance and care, particularly on approaching and crossing the lines of route taken by these fast steamers.

Telegraph cables are laid from various parts of the coast described in this work, several of which cross the English Channel, viz, between Havre and Beachy Head, Cape d'Antifer and Beachy Head, Dieppe and Beachy Head, Cape Gris Nez and Dover, Sangatte (near Calais) and Dover, Calais to Dover and the South Foreland, La Panne and South Foreland; a cable also leaves the shore at Huttes d'Oyes near Gravelines, and is laid to the Danish island of Fano. Guernsey is in direct cable communication with Dartmouth and with the other channel islands, and Jersey with Pirou, on the French coast. A trans-Atlantic cable is laid from Havre to America, via Ballinskellig Bay, Ireland. A cable is laid between Havre and Cuckmere.

Most of the cables are so laid as not to interfere with anchorage ground; where this has not been possible, marks for avoiding them are given in the detailed descriptions of the respective localities. Mariners should never anchor near their known position.

Radio stations have been established at Ushant, where messages are received and transmitted to destinations in France, Tunis, and

Algeria; also at Boulgne, Cherbourg, and Dunkerque; at St. Peters Port, Guernsey; and at Alderney.

Radio fog signaling, by means of Hertzian waves, has been experimentally introduced at Creac'h Point and the Ile de Sein Lighthouses.

The transmission taking place in all directions, no assistance is afforded for obtaining a direct bearing of the locus.

The limiting range at which a signal of the provisional 120 meters wave length can be distinguished is probably about 20 miles; the strength of a signal at the receiver varies directly with the distance; hence only relative arcs of position can be derived.

Lloyd's signal stations are established at Ushant and at Cape Gris Nez.

Life-saving stations.—Life-saving stations are established on the most exposed parts of the French coast. The more important have life boats, and the stations of less importance have mortars, rockets, and other life-saving apparatus.

Particulars of fishing fleets to be found in the waters round the British Isles, and methods of avoiding damage to their gear. General observations.—The principal methods of fishing are trawling, drift net, and line fishing. The latter presents no obstruction to navigation, and comparatively few vessels are employed in it.

Trawlers.—Single trawlers may be met with anywhere in the North Sea, or off the coasts of Great Britain.

Ramsgate trawlers, in groups of about 20, are usually met with between the Outer Gabbard and the Sandettié Lightship.

Caution.—Care should be taken to pass a single trawler at a distance of at least 200 yards, if passing to windward, on account of the trawl being towed from the weather quarter. Such trawlers may be passed close to on their lee side.

Fleets of trawlers are best avoided by steering round the fleet. They usually anchor one boat as a mark boat, and the "Admiral" signals to his fleet by firing rockets. Searchlights are sometimes used. Boats of one fleet all tow in the same direction. A few boats are fitted with wireless installations.

Drifters are usually met with in large clusters of sometimes many hundred boats, covering anything from 40 to 160, or more, square miles of sea; they should, if possible, be avoided altogether, more especially at night.

In the North Sea' and English Channel, and off Ireland, herring, mackerel, and pilchards are caught in drift nets (pilchards are fished for only off the Cornish coast), the boats employed being principally Scottish, or belonging to Yarmouth and Lowestoft.

Steam, motor, and sails are employed, the numbers of the two former increasing rapidly.

Sailing drifters can always be distinguished from trawlers by having no topmasts, and in the case of Scottish boats by their peculiar hulls and large dipping lugs.

When lying at their nets, except in fine weather, the foremast is lowered. Steam and motor drifters often keep their foremasts lowered while under way.

Lights.—At night the regulation two white indicating lights are carried, and by passing to leeward of the high light a vessel should clear the nets.

Times and places of fishing.—General information.—In the beginning of the year some of the steam drifters from Lowestoft and Yarmouth go to the mackerel fishery off Cornwall, returning in April to refit.

Of recent years there has been a tendency for East Anglian and some Scottish steam drifters to fish for herrings in December, with the French boats, off Boulogne, or with the West of England boats out of Plymouth, Padstow, and Milford Haven.

The principal fleets to be met with in the English Channel are:

Between South Foreland and Dungeness: Trawl, line, and drift.

Between Rye Bay and Beachy Head: Trawl, line, and drift.

Between Portland and the Start: Trawl all the year round.

Between Eddystone and the Lizard: Trawl all the year round.

Between Eddystone and Rame Head: Line fishing, May and June, and from October to December.

Between Dodman Point and St. Ives: Large drift-net fleets, from July to March.

Fleets are generally in the line of traffic between Beachy Head and Dungeness, and between Lands and the Lizard.

For mackerel, net fishing takes place from May to July, and by line from May to September.

The Boulogne fishing fleet extends its operations very far afield; they are to be met with in Iceland, Wessant, in Morocco, and in Newfoundland.

Directions.—(*a*) A vessel should, if possible, avoid passing through a fleet of drifters, for she may have considerable difficulty in doing so without damage to nets; the nets of one boat lie so close to those of another that, in maneuvering to pass the end of one line, a ship is very apt to find herself in the middle of another.

(*b*) If forced by circumstances to cross a line of drift nets, the least damage will be done by crossing them at right angles, midway between two of their buoys, at a fair speed. If possible propellers should be stopped while passing over the nets. The mere parting of a net does no great harm, but a revolving propeller may draw up the headline and net, thereby doing considerable damage.

Cases have been reported of large steamers having to be towed into port, helpless, after fouling drift nets.

(*c*) The tops of herring nets lie from 2 to 3 fathoms beneath the surface, so that light draught ships may do no damage at all, but it is better to avoid altogether, if possible, a drift fleet. Mackerel and pilchard nets are on the surface.

(*d*) If a steam or sailing vessel is seen by day with the foremost down and mizzen set, that vessel is a drifter riding to her nets.

(*e*) A drifter usually lies stern on to her nets; the nets are shot in line with the wind, the boat being at the lee end. When stem on she has her mizzen set, if stern on she has no mizzen set.

(*f*) The nets of British drifters extend from 1 to nearly 4 miles from the boat; their tops are secured to the warp, which, except in the case of mackerel and pilchard nets, lies about 2 fathoms below the surface.

(*g*) The end of the line of nets may or may not be marked by a buoy and a flag, or by a white float, and there are intermediate red or green buoys or floats about 40 yards apart.

French, Dutch, and German drifters' nets are of a heavier type, the warp being 3 fathoms below the surface; they vary in length from 2 to 4 miles, and are marked by flags as well as by floats.

(*h*) The rules of the road should be strictly adhered to with regard to lights carried by fishing vessels.

(*i*) Drifters carry very bright lights, usually visible 5 miles in clear weather.

(*j*) When nets are being hauled at night powerful acetylene lamps are used on deck.

(*k*) In places where drift-net fishing is being carried on, if two white lights are seen at night they probably belong to a drifter.

(*l*) If a ship has to pass close to a drifter, she should pass to leeward of her; the higher light shows the clear side, and the lower light shows the direction in which the nets extend.

CHAPTER II.

USHANT TO HEAUX LIGHTHOUSE.

Rounding Ushant from the southward—Caution.—Steamers approaching the English Channel from the southward are often glad to make Ushant for the purpose of ascertaining their exact position before shaping course up channel; otherwise, there is no reason to pass close round this island commensurate with the dangers which may attend the attempt. The gain in distance by steering from off Cape Villano to a point 10 miles westward of Ushant, instead of 40 miles westward, is, if intending to make the Start, only 5 miles, or if intending to make Portland Bill, 8 miles, in a total distance of 530 miles.

Mariners approaching Ushant should be on their guard against the danger of being set eastward of their reckoning, and must exercise the greatest caution in rounding it. That island is surrounded by dangers in all directions; rocks are numerous and some lie far from the land; fogs and thick weather are not uncommon; the tidal streams are strong, and the extent of their influence seaward undetermined. No dependence can be placed on seeing the lights, although they are very powerful, or upon hearing the fog signals in thick weather, and when such prevails the island should be given a wide berth; the lead should be kept constantly going, with the vessel proceeding at a moderate speed, and depths exceeding 60 fathoms should be maintained, allowing for the height of the tide, the range of which exceeds 3 fathoms.

In fine weather Ushant can be rounded at a distance of about 10 miles, unless bound for western French ports, when a somewhat nearer approach may be permitted.

Sailing vessels should in all circumstances give Ushant a wide berth.

Approach to Ushant—Currents.—In approaching Ushant the effect of a possible current requires careful consideration, for as the currents in this vicinity are temporary, resulting from recent, and probable remote, gales, the direction may differ from that indicated by the run of the swell.

Westerly gales force the water into the Bay of Biscay and cause it to accumulate there until it forms a head of water, which then flows northward along the coast of France and northwestward across the entrance of the English Channel; it is improbable that this, the Rennell current, is experienced within 20 miles of Ushant, as it is deflected off that island by the Chaussée de Sein, and the usual set near Ushant is eastward. The Rennell current is not often experienced, but it attains at times a rate of 1 to 1½ knots an hour, and its possible existence should be borne in mind when navigating in this vicinity.

Tidal streams.—About 4 or 5 miles northwestward of Ushant the flood stream sets northeastward, and the ebb southwestward, at the rate of 3 to 4 knots at springs; the rate of both streams increases rapidly as the island is approached. Toward high water the flood stream turns more eastward, or more directly toward the rocks. Between Ushant and the Chaussée de Sein the flood stream sets eastward and the ebb westward, turning at high and low water at Brest, so if the Chaussée de Sein is passed by a vessel bound northward about the time of low water at Brest (which corresponds with the time of low water at Ushant) the indraft, or set of the flood stream, will be very strong. In the offing the streams run for three hours after high and low water.

Soundings off Ushant.—Soundings obtained in 1892 by the French Government show that the bottom for many miles around Ushant is so generally level, with numerous irregularities, as entirely to prevent any estimate of the distance from the land being formed, in thick weather, by the lead alone. But a ship will pass well clear of Ushant, if she is kept in depths exceeding 60 fathoms, allowing for the range of the tide, which, near Ushant, at springs, exceeds 3 fathoms. In thick weather the lead (and the lead only can give safety) should be kept constantly going.

About 4 to 5 miles northwestward of Ushant is a remarkable depression, extending 7 miles in a NE. ½ N. and SW. ½ S. direction, with a breadth of 1.5 miles, in which the depths are from 75 to 105 fathoms.

Caution—Fogs near Ushant.—It is not always possible to determine from the land the existence of fog banks in the offing, and when a signal depends on steam an hour may elapse from the time it is judged necessary to use the signal before it can be worked; also it is known that large areas of silence exist around many fog-signal stations, so although the lights on Ushant and the fog signals are of great power, no confidence can be felt in thick weather of seeing the lights or hearing the fog signals, and many vessels have been lost by trusting to them in weather which seemed, to the mariner on board, to be only a little thick.

Bound southward.—It is advisable in a steamer leaving the English Channel for the southward in clear weather to sight and pass Ushant at a distance of about 10 miles for a departure; but in thick weather to keep well clear. Sailing vessels, except those from western French ports, should not, as a rule, pass in sight of Ushant, but, even with a fair wind, make good westing, bearing in mind that the prevailing winds and currents have a tendency to set toward Ushant and into the Bay of Biscay when southward of it. To get well to the westward is therefore of the greatest importance.

Ushant Island, or Ile D'Ouessant, lies 10 miles westward of the western extreme of the coast of France. It is about 4.3 miles long, 62°–242°, about 2 miles wide, and its highest part, toward the northeast, is 195 feet above the level of the sea. In fine weather the island is visible from a distance of 15 to 20 miles, the outline appearing rugged and uneven; its coast is composed of precipitous rocky cliffs of granite formation, except at its southwestern end, where it is but little above high water and bordered by rocks. It is surrounded by dangers, but it has three bays in which small vessels find temporary shelter. There are two lighthouses, one on the northeastern part of the island, the other on the northwestern.

The inhabitants, about 2,500 in number, are chiefly employed in rearing cattle and as fishermen; many of the latter are well acquainted with, and can act as pilots for, the passages in the vicinity rendered dangerous by the numerous islets and rocks, covered and uncovered, lying between the island and the mainland, as well as by the great strength of the tidal streams. The people, generally, speak pure Breton.

The chief village on Ushant is Lampaul, situated at the head of a bay on the southwestern side; St. Michel village is in the middle of the island. In the other parts of Ushant the houses are scattered, forming only small hamlets. Postal communication is maintained with Le Conquet on the mainland, at which place the produce of the island, consisting of soda, grain, sheep, and poultry is mainly disposed of.

Supplies.—Wood is scarce, but water and other supplies can be obtained in moderate quantities; for fuel, the natives find a substitute in dried seaweed.

Lights.—**On Creac'h Point,** the northwestern extreme of the island, is a circular tower, 152 feet high, painted with black and white horizontal bands, from which is exhibited, at 223 feet above high water, an electric group flashing white light. The light is visible 21 miles, but the intensity of its flashes enables the glare to be seen considerably beyond that distance. It is partially obscured eastward in the direction of the Four Rock Light by the higher intervening points of Ushant.

Fog signal.—On the upper gallery of Creac'h Lighthouse during thick or foggy weather a siren is worked by compressed air. The sound may be heard several miles in favorable atmospheric conditions, but in others, especially with westerly winds, the signal is heard only a short distance. A submarine fog signal is experimentally sounded 130 yards northward of Creac'h Point Lighthouse.

Stiff Point.—On Stiff Point, at the northeastern end of the island, and on the northern side of the Baie du Stiff, stands a conspicuous lighthouse, consisting of two round white towers united, 85 feet high, from which, at an elevation of 272 feet above high water, is exhibited a red and white flashing light. The white flashes are visible 23 miles, the red flashes 19 miles.

Radio station.—A radio station is established near Creac'h Point Lighthouse, where messages are received and transmitted to destinations in France, Tunis, and Algeria. This station sends out a radio fog signal. There is also a radio station at Stiff Point for naval purposes (French) only.

Lloyd's signal station.—A Lloyd's signal station is also established near Creac'h Point.

Semaphores.—There are semaphore stations near both Creac'h Point and Stiff Point Lighthouses.

Life-saving.—Lifeboats are stationed at Lampaul and in the Baie du Stiff; there are line-throwing guns at the lighthouses on Stiff and Creac'h Points.

Baie de Lampaul, on the southwestern side of the island, is the port of Ushant; it is quite open to southwesterly gales. This bay is only used by small vessels, although the water is deep over a sandy bottom, which shoals gradually toward the head of the bay, thus rendering anchors less liable to drag with southwesterly winds. A rock named the Corce, the summit of which never covers, lies in the middle of the bay.

La Jument—Light.—From an octagonal granite tower, 152 feet in height above the rock La Jument, is exhibited a group flashing red light. It is elevated 118 feet above high water and visible 17 miles.

Fog signal.—From the upper gallery of the lighthouse during thick or foggy weather a siren is worked by compressed air. It is established experimentally.

There are two mooring buoys in Lampaul Bay, to which vessels may secure, the inshore buoy in 2¾ fathoms, the outer in 6 fathoms, but it is generally advisable to anchor farther out in a depth not under 6 fathoms, sandy bottom.

The dangers to be avoided in entering this bay are Jument Rock, Basse Bridy, and the Leurvas Rocks. Jument Rock uncovers 19 feet at the lowest tides, and lies 228° 1.3 miles from Runiou Pyramidal Beacon, which is near Runiou Point, the southern extreme of Ushant; from the rock Belanger Mill open 3° eastward of Corce Rock bears 29°. Basse Bridy Rock bears 250° 1.7 miles from the Runiou Beacon: and Leurvas Rocks, the highest head of which dries 18 feet at the lowest tides, extend 228° 1,100 yards from the northern point of the bay.

A rock, with a depth of 4¾ fathoms on it at low water, lies on the northern side of the bay, with the Corce center bearing 180°, distant about 400 yards; and a small rock, with a depth of 3 feet over it, lies close to the south shore, with the east end of Corce bearing 267°, distant nearly ½ mile.

Stiff Point Lighthouse, a little open northward of Corce Rock, bearing about 58°, leads into Lampaul Bay, between Basse Bridy and Leurvas Rocks. Corce Rock may be rounded close-to on all sides. There is anchorage in depths of from 12 to 7 fathoms, sandy bottom, northward of the Corce (avoiding the 4¾-fathoms rock), but small coasters anchor near the head of the bay, southward of Men ar Blanc Rocks, which are marked by a black beacon tower, with a cylindrical top mark, 14 feet above high water, and where a mooring buoy is placed for the use of vessels weighing and requiring a warp. The bay is rarely free from swell. There is a small harbor southward of the village, inclosed by jetties, where coasters and fishing boats ground.

Rock.—A rock with 3 feet of water over it at low-water springs lies at a distance of 2,400 yards 262° from Runiou Point Beacon. The belfry of Lampaul church just open to the northward of the summit of Le Corce Rock leads to the northward of this danger.

Pilots.—The pilots reside at Lampaul, and have only small open boats; therefore they are seldom able to board vessels except in fine weather and at slack water (that is, from half an hour before to half an hour after high or low water) at springs or at neaps. If a pilot is required, it is important to attract attention by signal, as so many vessels not wanting them pass close to the island.

Chaussee de Keller.—At 2 miles, 10° from the west extreme of Ushant, and 3 miles, 281°, from Stiff Point Lighthouse, is Basse Callet, a small patch of 11 fathoms, but on which the sea breaks, with depths of from 21 to 28 fathoms close around it, forming the western extreme of Chaussée de Keller, a chain or causeway of rocks, covered and uncovered, extending 281°, about 1.3 miles, from the western part of Keller Isle. From the center of Basse Callet, Stiff Point Lighthouse is in line with Keller Isle, bearing 101°; and Bélanger Mill, the most westerly will of Ushant, on with the western end of Callet Rock, 143°.

Baie de Beninou, between Keller Isle and the north extreme of Ushant affords shelter during southerly winds, in depths of from 7 to 12 fathoms, sand and rocky bottom, but it is quite exposed to the northward.

There is a mooring buoy placed in the bay in 9 fathoms, which can be used by vessels under 240 feet long.

Baie du Stiff, on the northeastern side of Ushant, affords temporary anchorage for small vessels, and there is a mooring buoy here in a depth of about 13 fathoms; the bay is open to the eastward and there is always a heavy swell, even with westerly winds. The dangers to be avoided on entering are Men Corn, Douellan Rocks, and Légounec Bank, off its southern point; and Gorlé Bian Rocks in the middle of the bay. Gorlé Bian Rocks is marked by a red metallic beacon with a conical topmark, both 14 feet above high water, springs. Men Corn and Gorlé Bian Rocks uncover at half tide.

La Basse du Fromveur, with a depth of 2¾ fathoms over it, lies nearly ½ mile 149° of Men Corn; a considerable eddy is produced over it by the stream, which should be avoided even in fine weather.

Roc'h Mel Rock, 294°, open north of Gouent Meur Rock, leads northeast of the Basse du Fromveur and all the shoals off Stiff Bay.

Baie Darland, on the southeast side of Ushant, lies between Enes Nein, a large rock always uncovered, on the west, and Youc'h Islet on the east; it is exposed to southerly winds and sea, and there are several shoals at the entrance, the outer of which, basse Darland, lies about ½ mile offshore, and has a depth of 10 feet over it at lowest water.

Baie de Pen ar Roch, on the southern side of the island, is very exposed, and must not be approached in bad weather. A mooring buoy lies about 300 yards from the shore, and there is a small pier, used by the steamers, which runs regularly to and from Brest, Le Conquet, and Molêne, for landing passengers and goods.

Tides and tidal streams.—It is high water, full and change, on the coast of Ushant, at 3h. 46m.; springs rise 19¼ feet, neaps 13¾ feet above low water, ordinary springs.

About 2 miles southwestward of Ushant, the flood or northeast-going stream divides, one portion rushing through the Passage du Fromveur, the other along the northwestern side of the island, near which it attains at times a maximum rate of 7 knots. The ebb or southwest going stream divides similarly off the northeastern end of the island, but its rate is not quite so much.

At the distance of about 6 miles northwestward of the island, the flood sets northeast at the rate of 3 knots; the ebb, southwest at 2½ knots, both streams increasing rapidly as Ushant is approached.

About half flood an eddy sets southwestward on the northwestern side of the island, and sometimes extends nearly 2 miles offshore; the stream, therefore, within that limit runs for nine hours to the southwest. A similar eddy forms at half ebb at the southern end of the island, the stream, for about a mile offshore, running northwestward for 9 hours across the entrance to the Baie de Lampaul.

Haut Fond d'Ouessant.—About 3.3 miles 230° from the southwestern point of Ushant is the northern end of a bank, about 1.8 miles long, north and south, and ½ mile broad, on which are depths of 25 to 30 fathoms water, broken shells. Around the bank the depths are 50 to 57 fathoms, with 49 to 46 fathoms between it and the shoals extending off Ushant.

Channels between Ushant and the mainland.—Nearly all the space between Ushant and the French coast is studded with islets, rocks, and shoals, particularly in the direction of St. Mathieu Point, which bears 118° 16 miles from Creac'h Point Lighthouse. Creac'h Point Lighthouse open westward of Runiou beacon, bearing 328°, leads clear of all these dangers. Beside many intricate passages there are three deep channels between the islets and rocks, viz., the Passage du Fromveur, Chenal du Four, and Chenal de la Helle; the first only, in case of necessity, may be taken during daylight by a stranger; the others are very difficult, and sunken rocks lie nearly in their fairways, but the Chenal du Four is now marked and buoyed, and may be navigated by steamers with the aid of pilots.

Passage du Fromveur, with a depth of from 25 to 35 fathoms, runs parallel with the southern coast of Ushant, along which are many rocks and rocky patches, but none extend offshore more than ½ mile, though the dangerous Basse du Fromveur, with but 2¾ fathoms water over it, lies at that distance 152° from Men Corn Beacon. The Fromveur is but little frequented on account of the strong streams in it; the sea is very heavy during the ebb, with strong southwesterly winds; it is always dangerous to take during the strength of the stream, and also when it is not clear enough to enable the uncovered rocks and the beacons on the south coast of the island to be easily seen. It ought to be avoided by all ships in heavy weather, by sailing vessels except in cases of necessity, and then used only with the tidal stream; it should not be attempted at night.

The principal danger lies on the southern side of the channel, off the Rocky Isle of Loedoc, from which a rocky ledge extends 276° nearly ½ mile, having at its extremity Men Tensel, a detached rock, which uncovers 15 feet at the lowest tides. A white mooring buoy is placed about 200 yards to the northward of the rock. Most of the rocks on this ledge, however, are visible at half ebb, and there is generally broken water over them at other periods of the tide. Between this rock and Basse Darland is the narrowest part of the channel, which is but a little more than ¾ mile across.

Directions.—**From the southward** bound through the Fromveur Channel; when about 1.5 miles southward of Runiou Beacon, steer about 53° toward the Youc'h Rock, lying southward of the eastern end of Ushant, and keep it well open of Men ar Froud, on which is a black beacon tower with a cylindrical top mark, the top being 14 feet above high water. Pass Men ar Froud and Youc'h Rock at the distance of about ½ mile. After passing Men ar Froud keep Men Corn well open of Youc'h Rock to clear the dangers on the island side, also the Basse du Fromveur, with 2¾ fathoms situated ¾ mile 82° from Youc'h Rock. When Stiff Point Lighthouse is on with Men Corn, or Ile de Bannec is opened eastward of Loedec, steer to the northeastward as desired.

From the northeastward, round the eastern end of Ushant at the distance of about a mile, being careful to avoid the Basse du Fromveur, situated ½ mile 118° from Men Corn and ¾ mile 81° from Youc'h Rock. Basse du Fromveur will be passed when Stiff Point Lighthouse is on with the east end of Ushant, bearing 310°. Hence steer about 236°, passing about ½ mile from Youc'h and Men ar Froud Rocks, which is marked by a black beacon tower with a cylindrical top mark, 14 feet above high water, until Stiff Point Lighthouse is open westward of Pen ar Land Mill, bearing 8°, when, if bound to the southward, keep the lighthouse on the above, bearing astern, and make good a 188° course for 3 miles to pass westward of the Pierres Vertes. Creac'h Point Lighthouse, seen just over the southwestern point of Ushant, bearing 337°, leads about a mile westward of the outer patch of the Pierres Vertes, and the above lighthouse in line with Runiou Beacon, bearing 328°, leads just clear of the same patch and of the rocks and shoals lying to the eastward of this line of bearing, which are too numerous to mention. The mariner is therefore referred to the chart.

Buoy.—In connection with some works which are to be carried out on Pierres Vertes, a buoy has been moored at a distance of about 100 yards to the southeastward of these rocks.

When Ar Men Guen Gondichoc is seen between the barracks and signal staff of Molene, steer 146°, allowing for the tidal stream; this course, made good, will lead about 1.5 miles westward of the westernmost shoal of the Chausse des Pierres Noires, and when Pierres Noires Lighthouse (showing flashing red light) bears 90°, the course may, with discretion, be altered to the southeastward.

Tidal streams.—The tidal streams run in the direction of the channel, but are so rapid as to alarm persons unused to its navigation, particularly at springs, when they attain in the middle of the passage a rate of 9 knots and the whole surface of the water has the appearance of breakers.

Chenal du Four.—This channel lies between the islets and rocks southeastward of Ushant and the mainland. Notwithstanding its many dangers, it is practicable for vessels of deep draft, there being a least depth of 25 feet in the channel at lowest water. It is much used by steamers passing between the English Channel and the west coast of France and north coast of Spain, on account of the distance being shorter and the comparatively smooth water in it during westerly winds.

Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged. all vessels wishing to enter or leave the Chenal du Four are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

The fairway is limited as follows: On the north, by a line joining Les Platresses to La Valbelle; on the south, by the alignment of Pointe de Creac'h Meur and Vieux Moines Lighthouse. Also, southward of the parallel of Le Four Lighthouse, submarine vessels can only exercise submerged when at least 1 mile westward of the alignment of St. Mathieu and Kermorvan Lighthouses. These limits have not been placed on the chart plates.

Pilots.—When approaching the Chenal du Four from the northeastward, the pilots of l'Abervrac'h and Correjou are the most easily picked up. Their station extends to Brest, and they cruise in the vicinity of Ile Vierge.

The pilots of Porsal are also available for Brest.

The pilots of Conquet cruise usually in the Chenal du Four between Les Platresses and Conquet.

Semaphores.—There are semaphores established at Pointes de Corsen and St. Mathieu.

Life-saving.—A lifeboat is stationed at Le Conquet, and line-throwing guns here and at Kermorvan Lighthouse.

Directions.—The Four Channel may be used by steamers when the weather is clear, when the tidal stream in the narrow parts will not be strong against the ship, and when the depth of water is sufficient; it should not be taken without a pilot. The least water in the fairway of the channel is southwestward of Kermorvan Point, where at lowest springs there is a depth of 4 to 4½ fathoms. In this channel it is prudent to have about 10 feet of water under the ship, that she may steer easily in the strong streams which run here. Its southern entrance is about 1 mile southwest of cape St. Mathieu.

From the southward approach Chenal du Four with Kermorvan (square white tower) and Trezien (circular white tower) Lighthouses in line, bearing 7°, keeping that mark on until Les Vieux Moines Lighthouse (octagonal, black) is in line with the western Tas de Pois, bearing 128°, then steer 308°: the red buoy marking Fourmi Rock is left to the westward, and the black buoy marking the western extreme of the Penzers Shoals, also the black light buoy marking the Roche du Tournant to the eastward. When the west side of Goaltoc'h is in line with the east side of Petite Fourche, the summit of Grand Melgorne being between the two rocks, bearing nearly 7°, steer with those marks on (be very careful not to run westward of this line in rounding up to it), leaving Grande Vinotiere with its black octagonal tower to the eastward, and the red light buoy marking Roche du Rouget, also the red buoy marking Basse St. Pierre to the westward.

Upon Kermorvan and St. Mathieu Point Lighthouses coming in line, bearing 159°, steer northward with that mark on astern until well clear to the westward of the Four Lighthouse, leaving to the eastward Basse St. Paul, Le Tendoc, La Vabelle, and Basse Meur, the first three being each marked by a black buoy; and to the westward, the north point of the Chaussee des Pourceaux and Southeast Rock of the Platresses, each marked by a red buoy, also the Northeast Rock marked by a red light tower, and Basse St. Louis, unmarked.

At night, Kermorvan Light (quick-flashing white) in line with Trezien Light (fixed white), bearing 7°, leads into Four Channel from the southward; on entering the fixed green sector of St. Mathieu Light steer 310° (allowing for tide), with Vieux Moines Light (fixed red) astern, bearing 130°, and when Grande Vinotiere Light (fixed white) is in line with Corsen Light 10° (fixed red on this bearing), steer in that direction, but gradually open Corsen Light northward to get into its sector of white light, 12° to 15°, which sector leads in the fairway between Grande Vinotiere and the light buoy with green light marking the Roche du Rouget. Hence steer for Corsen Light in this white sector until Kermorvan Light is in line with St. Mathieu flashing white (main) light (which is strengthened by means of white fixed light over an arc of 2½° on either side of the leading line), bearing 159°; with this mark on astern steer 339° through the channel, past the fixed green light on Les Platresses Northeast Rock, until Le Four Light bears about east, when shape course according to destination. There is a fog bell in the gallery of Kermorvan Lighthouse.

Chenal de la Helle, 1.5 miles wide and available for large vessels, lies between the Platresses, a rocky ledge ¾ mile long north and south, and the Plateau de la Helle; on the northeastern side of the latter is Le Faix Rock marked by a red stone beacon. The direction of this channel is about 315° and 135°, and it unites with the Four Channel about 2 miles northward of Kermorvan Point.

There are, as previously stated, other channels through and among the islands used by those locally acquainted, which, however, are best understood by reference to the chart.

Shoals.—The following shoals lie in or near the northern approach to Chenal du Four and Chenal de la Helle:

Basse St. Louis, with 2¼ fathoms over it, upon which the sea breaks when there is any swell, situated 1.5 miles 320° of the Northwest Rock of the Platresses. At 1 mile 326° from the Platresses Light Tower is a similar rocky patch with 2½ fathoms.

Basse St. Charles, with 6 fathoms over it, lying about ¾ mile northwestward of Basse St Louis, which should be avoided, as the sea breaks with violence on it when there is any swell. All the shoal water between this shoal and the Platresses breaks in heavy weather from the northwestward, especially when the wind opposes the stream.

Basse Meur, a small patch of 4¼ fathoms, which breaks heavily in strong westerly weather, lies about 2 miles northeastward of Basse St. Louis. One mile southward of Basse Meur is Basse Bittess, with a depth of 8 fathoms over it.

Tidal streams.—Through the channels between Ushant and the mainland the flood stream runs to the northeastward and northward, the ebb to the southwestward and southward, following the direction of the several channels nearly everywhere. The flood stream begins in the south part of the channel at low water at Ushant, and rather later in the northern part, or 2¼ hours before high water at Dover.

In the Chenal du Four the greatest strength of the tidal stream at springs is 6 or 7 knots in the narrows at the Vinotiere; northward of the Platresses the rate is 3 or 4 knots. Near the Four Rock the flood stream begins to bend to the eastward, and in the immediate vicinity of that rock an eddy in the opposite direction is formed.

Northward of these channels, between Ushant and Ile de Bas, the flood stream sets about ENE. ½ E. and the ebb stream WSW. ½ W. In the offing of the Roches de Porsal the flood stream does not make until nearly three hours after low water at Ushant, and the ebb stream about three hours after high water at Ushant, each stream attaining a rate of 3 to 4 knots, and as much as 5 knots near the rocks, at springs.

Near the shore, the streams turn 1½ hours sooner than in the offing.

The coast between Ushant and Ile de Bas, 43 miles to the eastward, is moderately high, and in clear weather may be seen from a distance of 15 to 18 miles; it is, however, fronted by rocks, some of which lie nearly 3 miles in the offing, and from a distance have the appearance of houses. Unless absolutely necessary it is prudent to give this part of the coast a berth of 5 or 6 miles, especially at night, when it should not be approached within a depth of from 46 to 36 fathoms; the bottom at this depth is gray sand mixed with small pebbles, of various colors, resembling nuts.

When it blows hard on a weather tide, a berth of at least 2 miles should be given to the northern coast of the Ile de Bas, to avoid crossing the race or overfall produced by the uneven bottom extending from its northern shore.

L'Aberildut.—The entrance to this tidal port lies 91° about 11.5 miles from Stiff Point Lighthouse, Ushant, and 155° 3.5 miles from the Four Rock. The port is frequented by fishing boats and coasters.

It is the only place between Brest and the River Abervrac'h (which is 10 miles eastward of the Four Rock) that vessels drawing 12 feet can enter at high-water springs and be sheltered from all winds. During neaps the depth at high water is only 8 feet. At low water the port dries completely for 400 yards outside the entrance, but, the bottom being soft sand, vessels lie aground with safety. Le Lieu Rock, at the entrance to the port, is marked by a black tower, surmounted with a cylinder 15 feet above high water, and on which is a tide gage indicating the height of the tide above lowest water. A considerable amount of stone and sand is exported from the port: much of the stone used in the Thames Embankment came from this place.

There are two rocks in the anchorage; one, drying one foot, lies 94° 740 yards, and the other, with 4½ feet over it, 94° 760 yards from the tower on Le Lieu Rock.

Beacons.—A red iron beacon with a conical top mark, 15 feet high, has been placed on Pierre de Laber.

A provisional stone beacon, whose summit is 6 feet above high water, has been erected on Trois Pierres.

Telegraph cable.—A telegraph cable lands on the south side of the entrance to the port; two beacons, painted with white and blue horizontal bands and having round top marks, mark the landing place. The front beacon is situated on the beach near the telegraph house about a quarter of a mile to the northward of Perros village; the rear beacon is situated at a distance of 165 yards 97° from the front beacon and is not visible until nearly on this bearing. Vessels should not anchor or use drag nets on this alignment.

Light.—On the northern side of the entrance to L'Aberildut is a rectangular lighthouse, 13 feet in height, which exhibits at 35 feet above high water a fixed white light with a red and an obscured sector. The white light is visible 11 miles, red light at 9 miles.

Directions.—When about 2 miles off the entrance bring the tower of Breles Church, seen among the trees about 2 miles inland, a little open northward of the tower of Lanildut Church 79°; this mark leads up to the entrance, passing about 200 yards northward of the Pierre de Laber Rock, which uncovers 12 feet, and between the Trois Pierres on the north and Men Garo Rock on the south, which rock is covered at the highest tides only. From the entrance, which is about 150 yards wide, pass about 50 yards southward of a large rock connected with the northern entrance point by a jetty; then keep about 50 yards from the northern shore, and on rounding the point which forms the western side of the port of Laber, if desiring shelter only, anchor abreast of the first houses in that village, but to take in or discharge cargo run on to the quay, where the grounding places are excellent, the bottom being mud and sand. It is advisable for a stranger to take a pilot, or, as there are none belonging to the port, a fisherman does as well.

The best time to enter is about one hour before high water.

At night keep in the white sector of Abérildut light, which leads between the shoals to the entrance of that port.

Tides.—It is high water, full and change, at Aberildut at 3h. 58m.: ordinary springs rise 13 feet and neaps rise 8 feet above the grounding places off Laber, which dry about 9 feet at the lowest tides.

The tidal stream runs very strongly across the entrance to the southwestward during the first hour of the ebb and requires a fresh breeze to stem it. In the river the streams have considerable strength, the ebb as much as 3 knots between the entrance points, whence it sets right on Men Tassin and Descleo Rocks. .

Le Four Rock is a large and remarkable black rock, broad at the top and 17 feet high, lying 292°, nearly a mile from Melgorne Point, the northwestern extreme of France, and about east 10.3 miles from Stiff Point Lighthouse, Ushant.

Light.—From a circular masonry tower on the Four Rock, 85 feet high, is exhibited, at an elevation of 92 feet above high water, a fixed and group flashing white light, visible 15 miles.

On an axis of 244°, and for 20 degrees on either side of it, the flashes are divided into two parts by a partial occultation of very short duration, and their intensity decreases a little in proportion as the axis is approached.

Fog signal.—During thick or foggy weather a compressed-air trumpet is sounded.

Basse Boureau, a small patch with 5½ fathoms over it, lies about 1 mile westward of the Four Rock Lighthouse. It is dangerous on account of the strong eddies which form over it in fine weather and breaks with violence when there is much swell.

Argenton.—90° about 1.5 miles from the Four Lighthouse is the entrance to this little harbor, which dries at low water, and has a bottom of sand and mud; it is protected by a small jetty marked by a beacon, and is completely landlocked, but the surf makes itself felt in northwesterly gales. There is a depth of 14 feet in the harbor at high water, springs, but not more than half that amount at neaps. The only practicable channel to the entrance is between the Four Rocks and Petit Melgorne, and its approach is so hazardous that the smallest vessels require a skillful local pilot. A rather extensive fishery exists here.

There are two white masonry towers erected on rocks in the approach to Argenton.

Semaphore.—At about 1.3 miles northward of the entrance to Argenton is a semaphore station on Point Landuneves.

Roches de Porsal.—The body of this extensive ledge lies 4 miles northeastward from the Four Lighthouse and 5 miles westward from the entrance of the Abervrac'h River; the greater part of the rocks are covered at high water. The shoal patches on the outer part of the ledge extend 2.5 miles, and the rocks that uncover about 1.8 miles from the shore. There is anchorage among and several passages through them, but the navigation is too intricate to be attempted without a pilot.

Light.—**On Corn Carhai,** at the middle part of the ledge, a group-flashing white light is exhibited, from a masonry tower 60 feet in height, at an elevation of 54 feet above high water. The light is visible 13 miles. It is unwatched.

Buoy.—A spar buoy, surmounted by a cylindrical top mark painted black, is moored off the western side of the Roches de Porsal.

Porsal or Portsal.—This port, which is fronted by the Roches de Porsal, comprises three distinct bays; the western that of Tremazan or du Chateau, Kersaint, and the eastern bay, at the head of which stands the village of Porsal. In bad weather the swell and surf render the port dangerous. There is but little trade and no wharves for vessels.

Depths.—The harbor is completely dry by three-quarters ebb. Vessels drawing 13 feet can enter at springs, and those of 6 or 7 feet draft at neaps. The bottom is mostly sand, but a mass of rocks, which covers at high tides, occupies the middle of the harbor.

Several intricate channels lead to Porsal, but none should be attempted without a pilot. The leading mark for the South or inner channel is, Iurch Rock just closed in by Men Gouziane 49°: both of these rocks are marked by beacons. From the northwest the leading mark through the reef to the inner channel is Iurch Rock on with Ploudalmezeau Spire, bearing 110°.

Lifeboat.—A lifeboat is stationed at Porsal.

Pilots.—The pilots of Porsal cruise near the Four Rock and outside the Roches de Porsal in small cutters, which may be known by their having an anchor on the sail. They are qualified to conduct vessels as far as Brest, and, if required for the inner channels of the Roches de Porsal, are reputed to be the best obtainable.

Caution.—The coast in the vicinity of Porsal and Four Rocks is of moderate height, but, being bordered by numerous dangers, it should not be approached at night or in thick weather within the depth of 45 fathoms. The bottom at that depth is generally of gray sand mixed with flint and other stones.

L'Aberbenoit.—Between Porsal and l'Abervrac'h is a deep bight encumbered by rocks and shoals, into which the River Aberbenoit flows, forming a harbor of but little importance, though accessible to vesels of 11 feet draft at springs, and those of 4 to 6 feet at neaps.

It is approached by a deep entrance channel on either side of the Plateau de Rusven, a reef which dries in places at low water. The eastern passage is the broader and deeper, but with westerly winds the western passage is preferred, as it gives more room to clear the broken water caused by Ile Guennoc.

L'Abervrac'h.—The entrance to this river, nearly 6 miles eastward of Porsal and 4 miles westward of Correjou Bay, is difficult of access, being much encumbered by numerous shoals, islets, and rocks. It, however, affords good shelter to wind-bound ships. The outer roadstead is just within the entrance and about 300 yards southeastward of the black and red beacon turret on the Petit Pot de Beurre Rock.

Depths.—The outer road has a depth of from 6 to 8 fathoms over a sandy bottom at the lowest tides. The inner road is 1.5 miles in a 129° direction from the outer road, and the least depth is 5 fathoms, except at 250 yards northeastward of Cezon Isle, where there is a patch with but 2¾ fathoms. The space between the outer and inner roads affords good anchorage to vessels of large size.

The roads are separated from the port by a mole about 260 yards in length, where vessels discharge cargo and where water may be obtained. There are two beaching places on the left bank of the river, one in Anges Bay, the other a little farther eastward in St. Antoine Bay. The bottom in both bays is soft mud and dries 6½ feet at lowest tides. Since the increase of steam navigation the trade of this place has steadily declined. A large number of boats are engaged in the fisheries.

Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the port of l'Abervrac'h are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the east and south, by the coast; on the north, by the parallel of Ile Vierge Lighthouse; on the west, by the meridian of Corn Carhai Lighthouse. The above limits have not been placed on the chart plates.

Pilots.—The pilots of l'Abervrac'h and Correjou cruise in the vicinity of Ile Vierge. Their station includes the Chenal du Four, and extends to Brest.

Lights—Ile Vrac'h.—A fixed red light is exhibited on the eastern side of the entrance to Abervrac'h River, at an elevation of 59 feet above high water, from a square white tower with main building 36 feet high, situated at the southern end of Ile Vrac'h. This light is visible 6 miles.

Lanvaon.—A fixed white light is exhibited from a square white tower 66 feet high on Lanvaon Heights, which bears 100°, nearly 1.7 miles, from the tower on Ile Vrac'h. This light, elevated 171 feet above high water, in line with the light on Ile Vrac'h, leads through the Grand Chenal to the entrance to Abervrac'h River. It is visible 14 miles, through an arc of 16° on either side of the line of direction, the power of the light increasing as that line is approached. Two fixed lights are also exhibited on the left or western bank of the river, one white, at the head of St. Antoine Creek; the other green, on the eastern point of Palue Beach; when in line, 128°, they show the direction of the inner anchorage. These lights are, respectively, elevated 49 and 29 feet above high water, and are visible from the distances of 11 and 8 miles.

Buoy.—A mooring buoy has been placed on the leading line to the inner anchorage (St. Antoine light in line with Palue Beach Light), eastward of Ile Cezon.

This buoy is dangerous to navigation, day and night, during the strength of the tide, as it is immersed about 3 feet.

Lifeboat.—A lifeboat is stationed at Ile Vrac'h.

Semaphore.—There is a semaphore station on the hill overlooking the village of Abervrac'h, which may be seen from a long distance seaward.

Directions.—The Abervrac'h River can be entered by three channels, all of which are accessible to vessels of deep draft at high water, one, the Grand Chenal, being available at any time of tide; the latter is entered from the westward and passes southward of Libenter Ledge. The Chenal de la Malouine leads in from the northward between Malouine and Pendante Ledges; it is not recommended. The Pendante Channel lies between Libenter Ledge and the Pendante; its navigation is difficult, and should not be attempted without a pilot. Several dangerous rocky heads have been found (1900) in its narrow fairway.

The Grand Chenal is practicable for sailing vessels of deep draft by day or night, with a fair wind, and is broad enough for coasters to turn through, its narrowest part being 250 yards in width.

When approaching it from the westward bring the steeple of Plouguerneau church and the white light towers on Ile Vrac'h and on Lanvaon Heights in line, or at night the white and red lights in line bearing 100°, which lead in. If coming from the northward the steeple of Ploudalmezeau church must be kept well open westward of the steeple of Lampaul church 185° until the above leading mark is on, to clear the outside patches of Libenter Ledge; the depth on these patches is never less than 25 feet, but a heavy sea runs over them in bad weather.

In running through the Grand Chenal the leading mark must be carefully preserved, for although it takes a vessed 250 yards southward of the extreme of Libenter Ledge, marked by a black buoy, and nearly the same distance southward of Grand Pot de Beurre Ledge, on which is a black beacon turret, yet it leads only 55 yards northward of Basse du Chenal, a 9½-foot patch, and 80 yards southward of the beacon turret on the Petit Pot du Beurre, which at night may not be seen. Having passed the Petit Pot du Beurre a vessel may either come-to in the outer anchorage or proceed southward with the light tower in St. Antoine Bay on with that on Palue Beach, or at night with the white and green lights in line 128°. This being the line of direction for the inner anchorage, a berth may be taken as convenient, mooring northwest and southeast; or, if wishing to take the ground, a vessel can steer for one of the beaching places.

The Malouine Channel is about 120 yards wide at the narrowest part and can only be used with a leading wind; it is frequently barred altogether by breakers during a heavy swell from the westward. The white and red beacon turret on Petit Pot de Beurre exactly in line with the white tower on Petite Ile de la Croix 176° leads through in not less than 15 feet, though it only just clears the edge of the northeast rocky extension of the Plateau de la Pendante, where there are patches of 1½ and 9 feet. Pass half a cable eastward of Petit Pot de Beurre turret, when the vessel may anchor in the outer road or proceed to the inner anchorage as before directed.

It must be borne in mind that at 1 mile 354° of Petit Pot de Beurre Tower the leading mark passes very close to a 4-foot patch and that at 670 yards from the tower there is another patch covered only by 1 foot water at low tides.

Tides.—It is high water, full and change, at the entrance of the River Abervrac'h at 4h. 14m.; equinoctial springs rise 29 feet, ordinary springs 22 feet, and ordinary neaps 16 feet above the level of the soundings; neaps range 10 feet.

Ile Vierge is a mass of rocks without any vegetation elevated but little above the level of the sea, lying 2 miles eastward of the entrance to the River Abervrac'h, and 281° 2¼ miles from the western point of Correjou Bay. Between Ile Vierge and the mainland is a passage used by small craft when the rise of tide permits, and also the little bay of Porz Malo, where the above anchor close to the shore, grounding as the tide falls.

Light.—From a cylindrical granite tower, 246 feet in height, near the east point of Ile Vierge, a quick-flashing white light is exhibited at an elevation of 252 feet above high water, visible 22 miles.

The light is an excellent guide for the entrance to Abervrac'h and also for Correjou Bay; the old square lighthouse forms an additional day mark.

From Ile Vierge, the lighthouse on Bec-pol, Pontusval, bears 76° nearly 9 miles; the shoals fronting this part of the coast, of which the principal are the Plateau du Lizen-Ven, Plateau du Guern, Plateau d'Aman-ar-Ross, and the Basses St. Tregarec, extend 1.5 miles seaward of this line and the coast recedes nearly 2 miles. In coming from the westward, a vessel will clear all these shoals by keeping the tower of Ploudalmezeau Church well open westward of Ile Vierge until the lighthouse on Bec-pol bears 107°.

Correjou Bay.—In the western part of the above bight is Correjou Bay; Penenes Isle lies in its northern part and close northeastward of the isle is Penvers Ledge, which covers at high water, with the exception of three heads, at its southern, eastern, and northern extreme. A short distance eastward of the eastern head is the northwestern end of the Bazughen Ledge, which from thence trends 500 yards in a southeasterly direction, its highest head uncovering 10 feet at the lowest tides.. The Garrec-Crom Ledge, northward of the Bazughen, covers at high water, with the exception of one head at its eastern extreme.

Depths.—The anchorage in this bay is southeastward of Penvers Ledge and the depth is from 13 to 19 feet at low-water springs. The beaching place is southward of Penenes Isle; the bottom here is of sand, and it rises gradually toward the shore, at the foot of which it dries 16 feet above the lowest tides.

Directions.—Correjou Bay may be entered by two channels, the western lying between the coast and the southern part of Lizen-Ven Ledge; the eastern between Guern Plateau and a ledge named the Chaussee de Carrec-Hir.

To enter by the western channel, steer to the southward with Ile Vierge Lighthouse on a 174° bearing until the guardhouse on the point of Kerisoc is in line with the northern head on Penvers Ledge, 110°. Proceed with this mark on until half way between this rock and the Andolven Rocks, when Ile Vierge Lighthouse, seen over a remarkable gap or cleft in the Andolven Rocks, just to the left of the most northern rock, becomes the mark; and passing northward of Penvers Ledge, that mark leads between Garrec-Crom and the Bazughen and about 22 yards northward of a 4-foot patch nearly in mid-channel. Vessels may anchor in about 16 feet, sand, with this mark on, when Penvers and Mean-Yan are in line. Do not haul more to the southward for an anchorage before the highest head on the Garrec-Crom is northward of 5° 30′, for the southeastern head of the Bazughen bears 185° 30′ from this head; and, in steering to the southward, the highest head of the Garrec-Crom must not be brought more easterly than 0° so long as the southern head on Panvers Ledge is shut in southward of the north point of the bay. The swell is much felt in this bay above half tide, and, as no marks can be given for leaving it at night, it should only be used in the finest weather.

The leading mark through the eastern channel is the steeple of Plouguerneau Church, in line with the Mean-Yan Rock, bearing 189°. This rock is on the southeastern edge of the Guern Ledge and uncovers 23 feet. The mark leads in not less than 7 fathoms until the vessel is about 300 yards from the Mean-Yan, when steer a little to port to pass eastward of it. After clearing the southeastern edge of the ledge, bring Plouguerneau Church steeple to bear 189°, as before, and it will lead close westward of the Garrec-Crom, when proceed as previously directed.

Semaphore.—About a mile eastward of the anchorage in Correjou Bay is a semaphore station on the highland of Kerisoc.

Between the Baie de Correjou and Pontusval are the small tidal harbors of Treisseny and Kerlouan, of little or no importance.

Light.—On Bec-pol, near Pontusval, stands a lighthouse building with square turret 43 feet in height, from which, at an elevation of 59 feet above high water, is exhibited a fixed white light with red sectors. The white light is visible 12 miles, red light at 7 miles. The red sector showing over the Basses St. Tregarec and the dangers westward, does not cover all the shoal ground when approached within a distance of 2 miles.

Pontusval, the entrance to which port is about 1 mile eastward of Bec-pol Lighthouse and about 1.3 miles northwestward of the Greve de Goulven, is the only place on this part of the coast where the crew of a vessel driven on a lee shore could hope to be saved. It berths a large number of coasters, but the bottom is hard, and in strong gales from the northward it is not an unfrequent occurrence for them to be wrecked at their anchors.

Depths.—At low water the port dries out completely to abreast the western entrance point, and from thence the bottom rises gradually to the head of the port. It admits vessels of 11 feet draft at high water, ordinary springs, and those drawing 5 feet at neaps. A vessel is moderately well sheltered on the eastern side of the port in a little bay named La Chambre, in which the bottom dries 13½ feet above the lowest tides. The least depth at low water in the entrance channel, until abreast the western entrance point, is 13 feet. It is bordered on both sides by sunken rocks, and across it the tidal streams run obliquely.

A lifeboat and mortar apparatus, etc., are stationed at Pontusval.

Directions.—To enter Pontusval, when about a mile from the entrance, steer to the southward, with the beacon eastward of the customhouse office in line with the steeple of Plouneour church bearing 177°. This mark leads between the two rocks, Blanche de L'entree and Ar-Neuden or Fil, only about 70 yards apart. The former is on the western side of the entrance and its summit is always above water. The latter, which has on it a black beacon turret, with cylindrical top mark, 14 feet above the level of the highest tides, is on the eastern side and uncovers 12½ feet. When abreast of the Blanche de L'entree, steer a little more to starboard, to pass nearly midway between the Blanche du Center and Vran Rocks. The former lies on the western side of the channel and never covers, the latter on the eastern side and uncovers 27 feet. Pass rather nearer the Blanche than the Vran, and when near the Blanche du Dedans, a rock 200 yards southwestward of Blanche du Center, steer for the customhouse office on a 177° bearing, and it will lead into La Chambre, on the eastern side of the port.

Tides.—It is high water, full and change, at Pontusval at 4h. 25m., and the tide rises in La Chambre about 16½ feet at equinoctial springs and 5 feet at neaps.

The coast.—From the lighthouse on Bec-pol, Pontusval, Ile de Bas Lighthouse bears 73° 13.3 miles; between the two are the Greve de Goulven, Anse de Kernic, Port Nevez, and other small bays and creeks, places of little or no importance, and so encumbered by rocks and shoals as to be very dangerous to approach. The most outlying shoal in the neighborhood is Qeyn Cos, with 3½ fathoms; its outer extreme is 2.7 miles from the nearest land and 65° 4.3 miles from Bec-pol Lighthouse.

Greve de Goulven.—This deep, sandy bay affords shelter from westerly winds to vessels that can take the ground, but it is difficult of access, its entrance being full of rocks.

Anse de Kernic, or, as it is sometimes called, the Port de Plouescat, has a narrow entrance choked by rocks awash; it is reported to be gradually silting up, and much land has been reclaimed from the sea on its borders. The depth is from 6 to 15 feet at high-water springs, over a sandy bottom, which dries at half tide. The place is used only by vessels of from 60 to 80 tons, and, having neither quay nor wharf, they discharge cargo into carts alongside when left by the tide.

Ile de Siec.—This islet, lying between Port Nevez and Ile de Bas, from the western extreme of which its western rock, Golc'hedec, bears 212°, distant 2.8 miles, is ½ mile long, 95° and 275°, and is connected with the mainland by a rocky ledge which uncovers at low water, thus affording shelter to an excellent anchorage well out of the tideway. The place was formerly much frequented by coasting vessels, with the wind from northeastward around by east to the south-southeastward.

The anchorage is in a depth of from 5 to 6 fathoms, sand, with Golc'hedec Rock northwestward of Ile de Siec bearing 5° 30′, distant 600 or 800 yards; local knowledge is required in approaching it.

Ile de Bas is a low island, and, with the exception of its lighthouse, is not visible from the deck of a vessel at a greater distance than 9 miles; it lies immediately off the promontory of Roscoff, and when bearing 185° its outline becomes blended with the coast, from which the isle is only separated by a channel about 1,200 yards wide at its narrowest part. It is about 2 miles long, 95° and 275°, and ¾ mile wide, and is bordered on its western, northern, and eastern sides by rocks and shoals extending from ½ mile to a mile from the shore, most of which cover at high water. One of the most prominent, the Penven, always above water, lies 800 yards 5° 30′ from the northeast point of the isle. From Ile de Bas Lighthouse, Triagoz Lighthouse bears 63°, distant 16.3 miles.

Shoal.—A rocky shoal with only 3¾ fathoms over it is reported to exist 13.9 miles 8° from Ile de Bas Lighthouse.

Vessels should give this locality a good berth.

Ile de Bas to Trieux River—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations, or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels following the coast between Ile de Bas and Trieux River are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited, as follows: On the south and west by the coast between Ile de Bas Lighthouse and Les Heaux Lighthouse: on the east by the meridian of Les Heaux Lighthouse; on the north by a line drawn through Ile de Bas Lighthouse, Triagoz Lighthouse, Ile Rouzic (Sept Iles), and Barnouic Light beacon. The above limits have not been placed on the chart plates.

Light.—From a circular lighthouse, 131 feet high, erected on a mound ½ mile from the western end of Ile de Bas, a group-flashing white light is exhibited, visible 21 miles.

Semaphore.—There is a semaphore station on the center mound of Ile de Bas.

The population of Ile de Bas is about 1,200. On the south side of the island is the village and harbor of Porz Kernoch, the latter formed on its southwestern side by a mole extending out to the Malvoch Rock, marked on its southeastern edge by a beacon. A short jetty connects the Ile aux Moutons with the shore. The harbor dries at low water, has a depth of 6 feet at half tide and 19 feet at high-water springs; it is now but little used.

A lifeboat and mortar apparatus are stationed at the western end of Ile de Bas.

Channel between Ile de Bas and the coast.—On account of its difficult navigation this narrow channel is not much used, except by vessels of light draft calling at Porz Kernoch or Roscoff. Vessels drawing about 19 feet may, however, if necessary, run through it with a fair wind at high water slack tide.

Anchorage.—The anchoring ground in this channel is comprised between the meridians of the chapel of Notre Dame de Bon Secours and the village of Porz Kernoch, the depth being from 2 to 4½ fathoms. There is a long and narrow swashway with from 11 to 15 feet lying between the northern edge of the Traverse, a shallow, shifting sand bank which bounds the anchorage eastward, and the sand bank bordering the southern side of the isle; and, although the stream here runs with great strength, coasters prefer it to the anchorage just described, as they are well sheltered, and, if necessary, can beach on the sands in Porz Kernoch, where the bottom dries only 6 or 7 feet at the lowest tides.

Directions.—When bound through the channel between Ile de Bas and the coast from the westward, Ste. Barbe pyramid in line with the white patch on the Loup Rock 105°, leads northward of the Basse Plate, a rock which only dries 3 feet (marked by a red iron beacon with conical top mark, a red spar buoy being moored about 500 yards northwestward of it), and of the Lavandieres Rocks, which never cover, in not less than 6 fathoms toward the red beacon on the Oignon Rock, which uncovers 22 feet and must be left to the southward. When about 200 yards northwestward of this rock, or when the eastern mill on Ile de Bas and the little pyramid beacon on Kernoch Isle (seen over the mole) are in line, steer 90° for the anchorage, leaving the red beacon on the Tehibihan Rock to starboard; or, if not going to anchor, steer for Pen-ar-Chleguer Point until the western mill (westward of Kernoch Village) is in line with Kernoch pyramid beacon; this leads between Pen-ar-Chleguer Point and Per Roc'h, marked by a black beacon turret; it also leads southward of the beacon of An-Oan and of Duslen beacon turret, the latter requiring a berth of at least 75 yards in passing, to avoid a rock which dries at half tide distant 55 yards from it. When clear of this rock, the Duslen and Per Roc'h beacons in line lead out of the eastern entrance, passing from 20 to 30 yards only southward of the rock Ar-Chaden, which dries 15 feet at low water and forms the southern extreme of Ile Pighet.

Approaching the channel from the eastward, north summit of Ile Pighet in line with the eastern mill, bearing 295°, leads to the entrance, and as Ile Pighet is neared the leading mark already given Duslen and Per Roc'h beacons, 280° 30′, will come on, and the marks used from the westward will serve successively from the eastward; but it should be remembered that to navigate this channel at any time the services of a pilot are indispensable, there being a depth of but 1 foot at lowest tides in one part of the channel.

There is an anchorage of small extent within Ile Pighet, over a bottom of gravel and broken shells, where a vessel can wait for a favorable opportunity either to run through the channel or to enter Port Roscoff.

Telegraph-cable beacons.—Two beacons, having white and blue horizontal bands and being surmounted by conical top marks, have been established at Pen-ar-Chleguer Point to mark the landing place of the telegraph cable.

The rear beacon is situated near the telegraph house in the creek northeastward of Pen-ar-Chleguer Point; the front beacon is situated 197° distant 100 yards from the rear beacon.

Ar Chaden Rock—Light.—From a white octagonal masonry tower, 59 feet in height above the rock, is exhibited a fixed white light, elevated 39 feet above high water and visible 6 miles. The light is unwatched.

Roscoff is a small tidal harbor about a mile 141° from the southeastern extreme of Ile de Bas; it is formed by a mole of solid construction extending with an outward curve from the western shore a distance of 575 yards. Works constructed at Penar-Vil, on the opposite side, break the force of the sea during northeasterly gales; in bad weather, however, the swell within the harbor is sufficient to cause inconvenience and even danger. The town has railway connection through St. Pol de Leon with the general system of France. It has a population of about 1,000, and a thriving trade is carried on by vessels up to 200 tons, both English and French. Fruit, vegetables, fish, etc., are the chief exports.

The western mole is being extended (1914) to a point about 75 yards east of La Vache beacon. Both the limit of the extension as well as the limit of the intended channel are marked by a temporary beacon showing at night a fixed white light.

Dredging operations are also in progress. By day, the dredger hoists two black balls at the foremast and a red flag on that side which a vessel is not to pass; by night, at the fore end, vertically, two red lights over one white light, and a red light on the side not to pass.

Depths.—Roscoff is accessible to vessels of 12 feet draft at high-water springs, and to those of 5 or 6 feet draft at neaps. The grounding places dry from 12 to 19 feet at the lowest tides; the breakwater affords the only quay accommodation.

Lights.—A fixed white light, elevated 22 feet above high water and visible 7 miles, is exhibited from an iron standard on the extreme end of the mole at Roscoff. A fixed red light at 38 feet above high water, visible from the distance of 8 miles, is shown from an iron support at the lifeboat station at the head of the harbor. The two lights in line lead into the harbor by the northern channel. These lights are visible through an arc of 16° on either side of the leading line, their power increasing as this line is approached.

Directions.—Roscoff has several intricate approaches for fishing craft; two channels only are available for vessels of from 150 to 200 tons, viz., that from the eastward and that from the direction of the anchorage within Ile Pighet, for which latter the leading mark by day is the white spot on the magazine at the head of the harbor on with the extreme end of the mole, bearing 110°, and by night the two leading lights in line.

Approaching the port from the eastward, keep the southeastern extreme of Ile de Bas open northward of Tisaoson Isle until within 1,600 yards of the latter, then steer 217° for Pointe de la Fontaine (the first noticeable point southward of Ste. Berbe Chapel on the summit of Bloscon Point); when Roscoff church spire comes in line with Rannic Rock black beacon tower with cylindrical topmark bearing 261°, stand in on these marks, leaving the black beacon buoy with cylindrical topmark of the Basse de Bloscon on the port hand and the black and white horizontal striped beacon turret with diamond-shaped topmark of Men guen bras on the starboard hand until abreast of Bloscon Point, then open the church spire a little to the northward of Rannic Rock tower and pass the latter close to on the port hand, the distance between the tower and the rocks north of it being only about 50 yards. After passing the Rannic Tower head round for the pierhead, leaving Penar Vil on the port hand and La Vache red beacon on the starboard hand. This channel is difficult to navigate even at high water, and impracticable on the ebb.

Men guen bras—Light.—On the beacon, 38 feet above high water, is exhibited a fixed light with two white, one red, and one green sector, visible, respectively, 6, 3½, and 3 miles.

Lifeboat.—A lifeboat is stationed at Roscoff.

Tides.—It is high water, full and change, in Port Roscoff at 4h. 52m. The tides rise above the soundings at the anchorage in the eastern part of the channel between this port and Ile de Bas, 30 feet at equinoctial springs, 23 feet at ordinary springs, and 17 feet at ordinary neaps. Neaps range about 11 feet.

The coast.—From Pointe de Bloscon, the eastern entrance point of Roscoff harbor, to the northwestern point of Grande Ile, which lies 147° 4.5 miles from Triagoz Lighthouse, and is itself surrounded by other numerous isles and rocks, the bearing and distance is 75° 15.5 miles, nearly the whole of the dangerous Plateau de la Meloine lying seaward of this line. Between these points the land recedes and forms two deep bays, the shores of which are fringed by numerous rocks, many of them upward of 1.3 miles from the land. The bays are separated from each other by Primel Point, westward of which is Morlaix Bay, with the entrances to the Rivers Morlaix and Penze or St. Pol de Leon at its head, and eastward of it the little harbor of Locquirec and the River Lannion. There is good anchorage in Morlaix Road for vessels of the deepest draft and also in the eastern bay off the mouth of the River Lannion.

Plateau de la Meloine is a group of rocky heads with deep water between them, commencing 352° 1.5 miles from Primel Point, extending thence 5 miles in a 46° direction, and forming a most dangerous obstacle to navigation, especially to vessels entering Morlaix from the eastward. The western extreme of the ledge is called the Trepieds, of which the highest rock uncovers 9 feet; the marks for it are the steeple of Plougaznou Church in line with Carrec an Ti Rock bearing 155° and the two spires of St. Pol de Leon Church in line with Bisayers Rock 234°. At the eastern extreme of the plateau is the Carrec an Hir, with 10 feet water, and 1 mile westward of it Pongaro Reef, awash at the lowest tides. In the center of the plateau there is a group of large rocks, which are always uncovered.

Buoy.—A black buoy is moored off the western extreme of the Trepieds.

Clearing marks.—After passing Ile de Bas the Plateau de la Meloine may be cleared on its northwestern side by bearings of Ile de Bas Lighthouse. Coming from the eastward by bearings of Triagoz Lighthouse the Corbeau Rock in line with La Clarte Church Tower 85° leads 400 yards northward of the Carrec an Hir and Pongaro ledges. There is an inshore passage between the Meloine and the Chaises de Primel, the rocky ledge extending 2.3 miles eastward from Primel Point, for which the leading mark is the clock tower of Creiskar, St. Pol de Leon, in line with the northern side of Vezoul Ile 245°. This channel should only be taken by daylight.

St. Pol de Leon or Penze River has its entrance on the western side of Morlaix Bay. At 2.5 miles southward of Roscoff is the town of St. Pol de Leon, easily distinguished by the two lofty spires of its cathedral; adjoining is the little tidal harbor of Penpoull, between which and the Ile de Callot, 1.8 miles distant, is the entrance to the tortuous channel of the Penze River, beaconed in accordance with the French system, and crossed by a bridge 4 or 5 miles within the entrance at the village of Penze, up to which point it is navigable at high-water springs for coasters. Both flood and ebb streams follow the direction of the channel, and at half-tide springs run at the rate of 3 or 4 knots.

Vessels bound either to Penpoull or Penze after passing Tisaoson Ile at the distance of about ½ mile should steer to make a 180° course, allowing for tide, and when the turret on Benven Ile and that on the northern end of Ile de Callot are in line bearing 135° that mark leads between the Guerheon Rock, on which is a red turret, to the westward, and the Basse du Cordonnier, awash at low water, and situated 450 yards 231° from Le Cordonnier, marked by a black tower, to the eastward, in not less than 2 fathoms. When St. Sebastian Tower, the second tower southward of Ste. Barbe Chapel, is in line with the steeple of Roscoff Church 301° the vessel is at the entrance of the river.

Directly in the fairway to the St. Pol de Leon River, at the distance of from 300 to 700 yards southeastward of the beacon on Guerheon Rock, there is a cluster of rocky patches, over some of which there is but a depth of 3 feet at low tides; the services of a pilot are necessary.

Morlaix River.—The entrance to Morlaix River is on the eastern side of Morlaix Bay, between the Ile de Callot and Primel Point. Two channels lead into it, the eastern or Treguier Channel and the western or main channel; the former, although not nearly so deep as the latter, is generally preferred by coasters as its width admits of tacking. The channels unite between the Isles Louet and Noire, which are ½ mile apart, and thence it takes a 152° direction for 3 miles through Morlaix Road to the place where it is joined by the little river Dourdu. Above this are quays on either side where vessels may lie aground, and a small gridiron, and still higher up is the lock entrance to the wet dock, 1,350 yards in length, with a width of from 82 to 193 feet and a depth of 15 feet.

Depths.—The river is accessible by the main channel to vessels of the deepest draft at all times as far as, and ½ mile beyond, Morlaix Road. From thence it shoals rapidly, and is reported to be only navigable for vessels of 9½ feet draft up to the wet dock.

At the head of the wet dock is the town of Morlaix, with a population of about 14,000, and a railway station on the line connecting Rennes with Brest. The railway here crosses the river on a granite viaduct on 14 arches which is 973 feet in length and 183 feet above the level of the quays. The trade of the port is carried on by vessels of 80 tons, about 400 entering annually. A few small steamers also visit the port, and vessels of large size use the roadstead.

Coal to the amount of 11,850 tons is imported annually, and 600 tons are kept in stock. There is extensive coal-wharf accommodation.

Lights—Ile Noire.—From the square white tower of main building on Ile Noire, lying within the entrance of Morlaix River ½ mile 276° from Barnenez Point, a fixed light with red and green sectors is exhibited at an elevation of 46 feet above high water. The light in the white, red, and green sectors is visible 12, 7, and 6 miles, respectively.

Ile Louet.—On Ile Louet, situated 350 yards northeastward of Pen Lann, is exhibited from a square white turret 29 feet high a group white occulting light, with two green sectors. It is elevated 52 feet above high water and visible 12 miles the white light and 10 miles the green light.

Tour la Lande.—From a square white tower on the high land of the western bank of Morlaix River, about 2 miles within Pen Lann Point, a flashing white light is exhibited at an elevation of 285 feet above high water from the square white tower of a building 56 feet high. It is visible 21 miles.

Louet and Lande Lights in line, bearing 176° 30′, lead up to the main channel, passing eastward of Ile Ricard until the vessel enters the green sector of Ile Noire Light. The Noire Light in line with Lande Tower Light 190° 30′ leads through the Treguier Channel.

Approaching Morlaix, or while waiting for a pilot, it is useful to know that with the whole of Ile de Bas open northward of Tisaoson, a double-headed rocky islet 1,600 yards from the eastern end of Ile de Bas, a vessel is northward of all the shoals in the mouth of the bay.

Pilots.—Though the channels leading to Morlaix Road and River are well marked by buoys, beacons, and lights, they are so narrow and intricate that a stranger should always take a pilot.

Tides and tidal streams.—It is high water, full and change, in Morlaix Road at 4h. 53m.; equinoctial springs rise about 31 feet, ordinary springs 24 feet, and ordinary neaps 18 feet above the soundings; neaps range 12 feet. The streams turn at high and low water, with half an hour's slack, and at springs, when at their strength, run at the rate of 4 knots. Both streams follow the course of the various channels.

Tidal signals are supposed to be made from Noire Isle Lighthouse, but they are not attended to with regularity. It is better to trust to the indications afforded by the height of the water on the various rocks; for instance, when the Cadou Rock covers there is a depth of 17 feet in the Treguier Channel.

Rock.—A rock, 1¾ fathoms, lies at a distance of 2.1 cables 329° from the site of Astan Rock tower (destroyed).

Directions—Main channel.—Entering the Morlaix River by the main channel, steer toward the eastern end of Ile de Bas until Tisaoson Isle is seen. Having approached between the red buoy with conical topmark, moored northeastward of Astan Rock and the black buoy off the Trepieds, a little more than 4 miles apart, with Tisaoson bearing about 265° 3 miles, and the beacon turret on the Duon Rocks 231° about 1.5 miles, the vessel will be at the entrance of the channel and more than ½ mile 34° from the Basse N. E. du Pot de Fer, a 4-foot patch marked by a red buoy on its northeastern side, the patch lying 62° 500 yards from the Pot de Fer Rock, which uncovers 7 feet at the lowest tides. From this rock Ile Louet Lighthouse is just open westward of Ile Ricard 168°, and the beacon turret of the Duon Rocks is in line with the chapel midway between St. Pol de Leon and Roscoff.

Lande light tower in line with Louet Isle Lighthouse 176° 30′ leads through the main channel eastward of the Pot de Fer and Duon Rocks, and between the Vieille Rock, which dries 23 feet and is marked by a red beacon turret, and the Stolvezen, a 1-foot patch marked by a black buoy on its northeastern edge. Vessels of light draft with a fair wind or steamers with a sufficient rise of tide may continue with this leading mark on until abreast of the Calhic Rock turret, passing eastward of Ile Ricard′and 670 yards from the beacon off its northeastern end, and close to that on the Morlouine Rock, which dries 4 feet at low water, springs. Here is the narrowest part of the channel, as, only about 70 yards eastward of the Morlouine beacon, on its opposite side, a small plateau of rocks is awash at low water. Before entering the narrows at Ile Ricard the Roche d'Equinoxe, with 1¼ fathoms, lies exactly on the line of the leading mark. It is easily avoided by opening the Lande Light tower westward of Louet Isle Lighthouse until past it. A rock, which uncovers 3 feet, lies 30 yards 133° 30′ from the red tower northward of Ile Ricard. There are other patches of 15 and 9 feet in the narrows of the channel, though the general depths are from 4 to 6 fathoms until close up to the Morlouine beacon.

When abreast of the beacon on Calhic Rock, steer about south to pass between the beacon on the Corbeau Rock and that on the western part of the ledge extending from the northern end of Chateau du Taureau Islet, and then 155° past Louet Isle and the red buoy marking the northeastern edge of the Barre de Flot Ledge. When southward of Louet Isle and clear of the Barre de Flot, anchor as convenient in Morlaix Road.

Vessels of deep draft should pass westward of Ile Ricard; for which purpose, when nearing Vezoul Isle, they should quit the line of Louet and Lande Light towers in line, and bring the Pierre de Carentec (white) on with the white gable of Kergrist farmhouse 187° 30′; this leads between the Petit Ricard and Noire Rocks, both of which have beacons on them, and passes more than 100 yards eastward of Fourche and Courgik Beacons. When near the latter rock, which uncovers 14 feet, steer to bring the Paradis White Beacon turret in line with that of Trepied Jaune 318° 30′, which, astern leads between the foul ground southwestward of Ile Ricard and the Bizinnennou Beacon up to the Calhic Rock, from whence the directions already given lead to Morlaix Road.

Caution.—Both the Calhic and Corbeau Rocks extend a considerable distance from their beacon turrets into the channel, and great care is required in passing them.

From the direction of the Isle de Bas, the main channel may be entered by passing southward of the Duon Rocks; for which the leading mark is, Isle Pighet Beacon turret in line with the eastern mill on Isle de Bas 295° 30′. This line passes close northeastward of the Menk, Bisayers, Cochons, Noirs, and Vieille Shoals, and leads up to the leading mark for the main channel.

Treguier Channel.—Vessels intending to enter by this channel must ascertain that the tide has risen sufficiently to enable them to pass over the shallow flat, nearly awash at the lowest tides, lying in the narrows of the channel, and ½ mile in extent both northeastward and southwestward of Blanche Isle. If coming either from the westward or eastward outside all the shoals, bring Lande Light tower in line with Ile Noire Lighthouse 191°, as soon as they are seen; this leads westward of the black buoy on the Trepieds Ledge; eastward of the Pierre Noire, Tourghi, Grand Aremen, and Chambre Rocks, all marked by beacons; and, westward of the Jaune, Cadou, Vieille Chambre, and Plate Rocks, and also of the beacons on Petit Aremen, Menheur, and Blanche Isle.

The Pierre Noire dries 5½ feet, Tourghi 13 feet, Grand Aremen 13 feet, and Chambre 5½ feet; the northern rock of the Roches Jaunes dries 8 feet, the Cadou 12½ feet, Vieille Chambre 1½ feet, Petit Aremen 8 feet, and Menheur 13 feet.

A rock awash at lowest tide lies 270 yards 111° 30′ from Tourghi Beacon, and the same distance, 273° 30′, from La Plate Rock.

A rock which dries 2 feet lie 35°, distant about 600 yards, from Grand Aremen, and another rock, which dries 2 feet, lies on the leading mark and 46° 350 yards distant from Grand Aremen Tower.

La Chambre Rock extends almost on to the leading line.

When abreast of the beacon on Blanche Isle, steer 231° until the western side of Ile Ricard is on with Chateau du Taurcau Isle bearing 336° 30′, which line astern leads to Morlaix Road and to the channel of the river.

Entering Treguier Channel at night, bring Lande flashing white light in line with Noire Isle Light showing red, 191°, to lead through the reefs as before directed. Follow this line until the green sector of Louet Isle Light, when bearing 243° 30′, is entered, then haul up to 231° until the green sector of Noire Isle Light opens out, when the vessel should keep away again to 191°, and when out of the green sectors of both lights, she will be clear of the Barre de Flot Shoal, and may anchor in Morlaix Road as convenient.

When near the Jaune Rock in the Treguier Channel, or the Fourche Beacon in the Main Channel, vessels may, if necessary, change from one channel to the other, the leading mark for this purpose being the beacon turret on Ile de Callot open southward of the Colombier Rock, 260°.

Semaphore.—There is a semaphore station on the high land about 1 mile southward of Primel Point, on the eastern side of Primel Harbor.

Anse de Primel.—When leaving Morlaix River for Lannion Road, 10 miles 85° from Primel Point, a vessel will pass the little harbor of Primel lying just westward of the point; it has a very narrow entrance, for which the leading mark is the white chimney of Repredou farmhouse in line with a white mark on a wall, bearing 152°. To enter, vessels pass close to the Zamegues Rock, 14 feet above high water, marked with a red and white beacon, and still closer to the red beacon on Raoul Rock, where is the narrowest part, and within which is a small anchorage where vessels of considerable draft may lie afloat at all times, but the holding ground is very bad; the few small craft which use this harbor usually ground on sandy bottom higher up the bay. The place is frequented by pilots and fishing boats. Strong northerly winds cause much swell within the harbor, and at such times the entrance is frequently closed by breakers.

A lifeboat is stationed at Anse de Primel at the north end of the western shore.

Life-saving stations are also established at Ile Noire and at Plougasnou village.

Vessels bound for Lannion Road may pass northward of the **Chaises de Primel Rocks** by keeping the clock tower of Creiskar, St. Pol de Leon in line with the northern side of Ile Vezoul 245°, and when these rocks bear 186° may steer about 93° to pass southward of the Taureau Rock, lying in front of Lannion Roads, which dries 28 feet at lowest tides, and is therefore very seldom covered. The steeple of Guiodel Church, on the left bank of the Lannion River, a little open northward of the guardhouse on Servet Point, the northern point of the river entrance, or by night keeping within the white sector of Begleguer Light, leads to the anchorage in the road, which is exposed to the westward, but well sheltered from northward, round by east and south, to southwestward.

The coast between Primel Point and the Lannion River is foul and bordered with dangers. One hundred and four degrees 7 miles from Primel Point is Locquirec, a little tidal harbor on the eastern side of the promontory of that name formed by a stone pier about 130 yards in length. It affords indifferent shelter to a few small craft. Toullan Hery, also an inconsiderable port, lies at the bottom of the sandy bay adjoining Locquirec, where the little River Douron falls into the sea. Toullan Hery affords better shelter than Locquirec, but is more difficult of access. Southeastward from Locquirec Point is Pointe de Plestin, with another deep sandy bay beyond; and 26° 3.5 miles from Locquirec Point is the Taureau Rock, off the Bay of Lannion. The Parou and Felestec, two dangerous rocks, uncovering from 4 to 6 feet at low-water springs, lie between Locquirec and Lannion Bay.

Tidal streams.—The flood stream coming from the direction of Ile de Bas runs directly over the Plateau de la Meloine and toward the entrance of Lannion River, especially during the first four hours of the rising tide. Southward of the Meloine it sweeps past Primel Point and round the bay, setting to the northward along the eastern side and out between the Crapaux Rock and the isles off the point of the bay. The ebb stream takes an exactly opposite direction. In the offing both streams turn two and one-half hours later than inshore.

Lannion Road and Port.—The dangers in approaching Lannion are numerous. On the northern side the Crapaux Rock, 3.3 miles northwestward from Bihit Point, dries 13 feet at low water springs and from it shoal patches, dangerous to navigation, extend nearly 1 mile in a southerly direction. Four Rock dries 12 feet, ½ mile 321° of it a sunken wreck lies in a depth of about 12 fathoms. A black conical buoy is moored westward of the patches extending westward from the Crapaux Rock. Taureau Reef uncovers 28 feet, as before stated. On the southern side of Lannion Road is the red turret on the Kinierbel Rock. The anchorage in the roads is in depths of from 7 to 3½ fathoms.

Entrance—Depths.—The entrance to Lannion River, named the Guer or Leguer, is between points Dourvin and Servet; it is fronted by a bar which dries from 3 to 5 feet at low water, but may be entered by vessels of 17 feet draft at high water springs and of 11 feet at neaps. The town of Lannion, with a population of about 6,000, is nearly 4 miles from the entrance in a direct line, but much farther following the sinuosities of the river, which is 160 yards wide at Lannion, and has extensive quays on either side considering its very limited trade.

Tides—Bore.—The flood stream begins to make up the river at the entrance about one hour after low water, but not until 2 hours later at Lannion, at which place the ebb stream does not begin until one hour after high water. The flood stream has a maximum rate of 2 knots, the ebb stream of 2½ knots. This river, as high as Lannion, is occasionally subject to the phenomenon known as the bore; this takes place only when strong southwesterly winds are veering to northwest, and always on the ebb; the bore then comes up the river sometimes twice or thrice in one tide, and with sufficient violence to capsize small boats.

Light.—On Begleguer Point, ½ mile northward of the entrance to Lannion River, from the western face of the keeper's house, 20 feet high, a fixed light is exhibited at an elevation of 195 feet above high water, with red and green sectors. The white sector leads clear between the Taureau and Kinierbel Rocks. In the white, red, and green sectors the light is visible 13, 9, and 7 miles, respectively.

Directions.—In proceeding to Lannion Bay from the eastward, keep on the line of Ile de Bas Lighthouse 251° or Sept Iles Lighthouse 71°, and when Les Triagoz Lighthouse bears 17° keep it on that bearing astern, steering 197°, until Begleguer Lighthouse bears 93°, which direction leads to the anchorage off the mouth of the Lannion River.

Buoys.—The following buoys are established at the entrance of the river: A white mooring buoy situated at a distance of about 200 yards 110° from Guiodel Customhouse; a black buoy situated at a distance of about 300 yards 90° from the same place; a red buoy situated at a distance of about 550 yards 100° from the same place.

Semaphore.—There is a semaphore station at Bihit Point, on the northern side of Lannion Road.

Between Lannion and Perros Bays is a promontory, of which Ile Grande, connected with the shore, and Point Ploumanac'h or Mean Ruz are, respectively, the northwestern and northeastern extremes. Besides the Crapaux and adjacent ledges already mentioned, the coast in this part is bordered by innumerable islets, rocks, and ledges, extending 2 miles from the northwestern shore, and making any approach to it extremely dangerous. Three hundred and twenty-four degrees 5 miles from the center of Ile Grande is Triagoz Lighthouse and Sept Iles Lighthouse lies 352° 2.7 miles from Mean Ruz Point.

Plateau de Triagoz.—This dangerous ledge is about 4.3 miles in extent 270° and 90° and about 1 mile wide; its eastern end, on which are high rocks always uncovered, lies 276° more than 4 miles from the Sept Iles. There are numerous rocky patches on the body of the ledge, and near its western end one, named the Fouillie, with only 14 feet water, from which Triagoz Lighthouse bears 109° 3 miles. The summit of Fourchie Rock at the eastern end of the ledge is 34 feet above the highest tides. The channel between the Plateau de Triagoz and the Sept Iles, 4 miles wide, is clear of danger.

Light.—A square stone light tower, 82 feet high, stands on Guen Bras Rock, Plateau de Triagoz, from which Ile de Bas Lighthouse bears 244° 16.5 miles, and Sept Iles Lighthouse 85° 6.3 miles. From this lighthouse, at an elevation of 98 feet above high water, a fixed and flashing white and red light is exhibited. Over the shoals westward of Ile Grande the light shows entirely red, the flashes being visible 16 miles and the fixed light 14 miles.

There is life-saving apparatus at this lighthouse.

Fog bell.—During foggy weather a bell is sounded.

Caution.—At night, as soon as the light on Ile de Bas is sighted, a vessel running eastward with the flood stream should steer to pass well northward of it, and after passing the light should not bring it to bear westward of 223°, in order to clear the Triagoz ledge by about 3 miles, for this stream sets strongly to the southeast and does not turn in the offing until 3¼ hours after high water by the shore.

The Sept Iles, or Seven Isles, are high and barren, and in clear weather may be seen when 21 miles distant. The lighthouse on them bears 263° 15.5 miles from Heaux Lighthouse, and 85° 6 miles from Triagoz Lighthouse. The isles, with their rocks, ledges, and adjacent shoals, occupy a space 2.5 miles in width and 4.5 miles in length in a 62° and 242° direction.

Light.—From a square white lighthouse attached to a circular tower 52 feet high, on the eastern end of the southernmost isle, Ile aux Moines or Monks Isle, is exhibited at an elevation of 184 feet above high water, a group-flashing white light. The light is visible 20 miles except in the small arc where it is obscured by Rougic Isle and the eastern end of Bono.

Buoy.—A black conical buoy with staff and top mark is moored southward of the Dervinis, the southernmost rocks of the group; these rocks dry 10 feet at low water.

A lifeboat is stationed at Ile aux Moines.

The dangers between Sept Iles and the Plateau des Heaux mostly rise from depths of about 18 fathoms. Vessels passing outside Sept Iles and steering eastward should therefore keep well outside that depth. Sept Iles Lighthouse kept bearing southward of west until Heaux Lighthouse is seen, and it in turn kept well southward of 120° when within 5 or 6 miles of it, leads well outside all dangers.

The channel between Sept Iles and the mainland, though narrow, is available for the largest ships; the strong tidal streams at springs render it dangerous then to small vessels in bad weather with wind against tide.

Tidal streams.—In the center of the channel between Sept Iles and the mainland slack tide commences at 1h. 30m. after low water by the shore, and the flood stream is established 1h. 45m. later; the high-water slack commences 1h. 45m. after the greatest rise, and the ebb stream is established two hours later. Near the shore slack tide and change of stream take place sooner; further out they occur later. The tidal streams follow the direction of the channel, flood running east and ebb running west, at the rate of 4 to 5 knots an hour at springs.

Ploumanac'h Light.—On Mean Ruz, the northeastern extreme of Ploumanac'h Point, at an elevation of 69 feet above high water, a fixed red light is exhibited from the white square turret of a building 42 feet high, visible 5 miles.

Westward of Ploumanac'h Point is the little tidal harbor of Ploumanac'h.

Semaphore.—There is a semaphore station on Ploumanac'h Point.

Tides.—It is high water, full and change, at Port Ploumanac'h at 5h. 15m.; springs rise 24¼ feet, neaps 18½ feet.

Anse de Perros—Depths.—This bay, 1.5 miles wide at the entrance, is situated 2.5 miles southeastward from Mean Ruz; it affords good shelter from westerly winds to vessels that can take the ground. Those of light draft may lie afloat in the outer part of the bay, between which and the port at its head, which is almost dry at neaps, and has a depth of only 7 or 8 feet at high-water springs, the beaching places, on a bottom of muddy sand raised about 9½ feet above the lowest tides, are excellent.

Tome, a narrow islet nearly a mile in length 355° and 175°, lies with its south end 1 mile northeastward from the western point of the bay; its outer rocks, the Couillons de Tome, 321° 1,400 or 1,600 yards from the northern end of the islet, are marked on their western sides by a black and white spindle buoy. The highest part of the islet is about a third of its length from the northern end.

The little town of Perros-Guerec has about 2,800 inhabitants; its port is protected on the east by the Lenquin Jetty, 165 yards in length, a great portion of which is available as a quay, the total quay frontage of the port being 515 yards. There is little or no trade, the harbor being used chiefly as a refuge for coasters, which frequently run from the outer roadstead for shelter at high-water springs, but in so doing run the risk of being neaped.

Lights.—At Nantouar, in Perros Bay, two fixed white lights are exhibited; that close to the shore, near Nantouar Bridge, is 33 feet above high water and visible 11 miles. The inner light, at Kerjean, 143° 750 yards from the former, is elevated 253 feet above high water and visible 11 miles. Nantouar light turret is attached to a white house; Kerjean Lighthouse is a white circular tower 46 feet high, near a farmhouse. The two lighthouses in line by day, or the lights by night, lead into Perros Bay through the northwestern passage.

Two fixed white lights are also exhibited at the port of Perros, viz, the Colombier Light, shown from a white house at 110 yards behind the Colombier day mark, 89 feet above high water, visible in clear weather from a distance of 11 miles; and an inner light, from a white turret on a dwelling at Kerprigent, 224° 30′ 3,133 yards from the other, and at an elevation of 263 feet above high water, visible 14 miles. The two lighthouses in line by day or the lights by night lead into the bay through the eastern channel.

None of these lights are visible more than 16° on either side of the leading line. The power of the light increases as this line is approached.

The Colombier day mark is a white tower serving as a beacon and visible from a distance of many miles seaward.

A lifeboat is stationed at Perros.

Directions.—Coming from the westward inshore, Rougic Ile hidden by the Ile de Bono, Sept Iles, leads between the Triagoz and all the shoals northward and eastward of Ile Grande; and when the southern end of Ile Tome is open of Mean Ruz a course of about 79° leads between the Sept Iles and the northern end of Ile Tome, bearing in mind that the tidal stream sometimes sets through this channel at the rate of 5 knots. If desirous of entering Perros Bay from the northwestward, steer in for the southern end of Tome until Nantouar and Kerjean Lighthouses are in line. With this mark on, pass westward of two pointed rocks named the Bilzic, marked by a black beacon turret, which lie nearly a mile off its western side and uncover 22 and 32 feet, and eastward of the Fronde Rock, marked by a red spherical buoy, and of the red beacon turret on Bernard Rock, about 400 yards from the western point of the bay. Four patches, of which the highest is awash at low water, lie between this latter rock and the Pierre du Chenal, marked by a beacon turret painted with red and white bands; therefore, at low water, do not proceed farther southward than to have Perros Church opening southward of the hill on the western point of the bay. But, if proceeding to the port of Perros-Guerec, with a proper rise of tide, be careful to haul to the westward in good time to bring the Kerprigent and Colombier Lighthouses in line, which mark leads up to the port; and great care is necessary, for a vessel overruning this line will be upon the rocks.

Bound into Perros Bay from the eastward through the northeastern channel, which has but 3 feet water at one part at lowest equinoctial springs, pass northwestward of the black conical buoy marking the Guazer Rocks at the outer edge of the Four Ledge, by not going southward of the line of the high steeple of Notre Dame de Clarte on with the highest part of Ile Tome. As soon as the Colombier and Kerprigent Lighthouses are seen, bring them in line and steer for them. This leading mark clears all the reefs extending from the mainland, including the Crebineiers, marked by a black buoy; it also passes very close on the starboard hand the Pierre Jean Rousic, off the southern end of Ile Tome, which uncovers 1 foot, and the Pierre du Chenal beacon turret, which bears about 200° ½ mile from the southern end of Ile Tome, and which rock uncovers 14 feet. After passing close southward of this beacon turret the vessel may anchor about 300 yards southwestward of it in from 11 to 14 feet water; or, with a proper rise of tide, the same mark will lead her on past the black beacon turrets on the Roc'h Hu and Barr Goalenou on the port hand and the red beacon of Craou on the starboard hand, and after passing the latter she may haul up for the pierhead and enter the port.

By night.—Nantouar and Kerjean Lights in line, bearing 144° 30′, lead through the western passage into Perros Bay, Colombier and Kerprigent Lights in line 224° 30′ through the eastern passage. Vessels entering by the western channel should observe the caution already given and leave the line of the two former lights in one the moment the Colombier and Kerprigent Lights come in sight to avoid overrunning their line of direction.

Port Blanc.—From Perros Bay to Point du Chateau, the western point of entrance to the river Treguier, the coast trends eastward 9 miles and is fronted by innumerable rocks both above and below water, extending from 1.5 to 2 miles offshore. About midway is a little inlet, having depths of from 2½ to 3 fathoms, named **Port Blanc**, with Chateau Neuf Isle and the Four Ledge on the **western** side of its entrance and Leverette and St. Gildas Isles on the **eastern** side.

The port is well sheltered and affords safe refuge for coasters during southwesterly gales, but is open to winds from northwestward round by north to the northeastward; vessels caught by such winds frequently run ashore under the lee of St. Gildas Isle on a soft weedy bottom. With the wind eastward of northeast the anchorage is considered preferable to that in Perros Bay.

The leading mark in is Comtesse mill (whitewashed and without sails) on with the white beacon tower of the Voleur Rock, bearing 150° 30′.

Harbor light.—From a lantern near the white tower on the Voleur Rock, at the head of the harbor, a fixed green light is exhibited at an elevation of 53 feet above high water, visible 4 miles, through an arc of 3½° on either side of the leading line of bearing, 150° 30′.

Depths.—A vessel can anchor in 22 feet water or upward northwestward of the Louet, a large rock on the eastern side of the port, but better shelter in smaller depths can be had farther in. If the ground can be taken, good beaching places may be found eastward of the Voleur, where the bottom is 10½ feet above the level of the lowest tides.

Semaphore.—There is a semaphore station at Port Blanc. Not used in times of peace.

Life-saving.—There is a life-saving station at Port Blanc.

Passe du Northeast—Rock.—A rock with 4 fathoms of water over it exists on the east side of the channel, and about ½ mile 231° from La Jument red bell buoy.

Passe de la Gaine.—The white beacon wall of Plougrescan has a vertical black stripe on it, and the white pyramid of Men-Noblance has a black band halfway up.

Treguier or Jaudy River, the entrance to which is 9 miles in a 96° direction from the northeastern ledge of the Sept Iles Plateau, and 3.5 miles westward of Heaux Lighthouse, affords good shelter but is difficult of access to sailing vessels, and with gales from north-northwest to east-northeast (mag.) a heavy sea runs at the entrance on the ebb.

Depths.—The entrance, otherwise deep, is crossed by a bar with only 3 feet water between Ile d'Er and Corne Rock, which bar has over it at high-water springs 26 feet, and at neaps 21½ feet. The general depths, when within, are from 5 fathoms near the entrance to 2 fathoms near Treguier, to which depths must be added for high water, a rise of 23 feet at springs and 18½ feet at neaps. From the entrance nearly up to the little town of Treguier, a distance of 6 miles, the channel is generally over 300 yards in width. Near the town it narrows, and at one place is only 50 or 60 yards wide.

A tide scale, showing the height of the water above the soundings on chart, is graduated on the black turret of the Trois Pierres.

The town has about 3,500 inhabitants, has good quays with soft mud berths alongside, but, being 16 miles from the nearest railway has little or no trade. The river is spanned by a suspension bridge at Treguier. The three channels leading to the river entrance are the Grande Passe, Passe du Northeast, and Passe de la Gaine. They are all well buoyed and beaconed on the French uniform system.

Grande Passe leads to the entrance from the northwestward, and is practicable for vessels of any draft at high water. For this channel keep St. Antoine mill exactly on with the mill of Port de la Chaine, or, the white lighthouses of La Chaine and St. Antoine in line, bearing 136° 30′, when the vessel will pass about 600 yards westward of the black conical buoy marking Crublent Shoal and the same distance eastward of Renauds Rocks, which never cover, and over a patch of 22 feet, which, with the leading mark on, is the least depth in this channel. The vessel will also pass about 200 yards eastward of Pierre a l'Anglais Rock, which uncovers 8 feet, and still closer to the red spindle buoy marking the Petit pen ar Guezec Shoal, the highest heads of which dry 3 feet, and 400 yards westward of the black beacon on the Corbeau Rock, which uncovers 19 feet.

By night the red and white lights of St. Antoine and La Chaine in line, bearing 136° 30′, lead through the Grande Passe.

Passe du Northeast.—The large spire of Treguier Cathedral in line with the white tower on the Skeiviec Rock (which tower is 30 feet above the level of high water), bearing 207°, leads to the entrance of the river; but this line crosses the Jument Ledge, the western extreme of which lies 287° nearly 2 miles from Heaux Lighthouse, and is marked by a red conical bell buoy moored off its northern edge; the leading mark must therefore be left, both on entering and leaving the river.

To pass westward of the ledge and buoy, approach with the cathedral spire seen between the two turret beacons of Pen ar Guezec bearing 206°, until Creac'h ar Maout semaphore is on with the highest heads of the Duono Rocks, where the spire should be brought in line with the Skeiviec Rock beacon. Vessels not drawing more than 17 feet may, with this leading mark on, cross the Basses de Roc'h Hir after half flood or if the Petit Roc'h Hir is covered. This rock lies on the northeastern part of the ledge and uncovers 13 feet. This channel should only be used with smooth water.

Passe de la Gaine, the most easterly channel, is practicable with smooth water for vessels of 14 feet draft after 3½ hours' flood and is useful when approaching from the eastward if there is sufficient wind to stem the tide. The entrance is between the Heaux and Sark Rocks; the leading mark is the white beacon wall in the southeastern part of the village of Plougrescan on with the white pyramid of Men-Noblance, on the southern part of Ile d'Er, bearing 239°. This leads a vessel nearly ½ mile southward of Heaux Lighthouse and over the Pont de la Gaine, a narrow cut in the ledge extending from the southern end of the Duono Rocks, with only 1 foot water at the lowest tides.

Several rocks, covered by from 1 to 6 feet water, lie at the distance of about 1,200 yards southward and southwestward of Heaux Lighthouse, and the leading mark passes very close to some of them.

Lights.—Three lights are exhibited at the entrance of the Treguier River.

La Chaine.—Near the harbor mill of port de la Chaine is a fixed white light, exhibited from the keeper's white house, elevated 36 feet above high water and visible 7 miles.

St. Antoine.—Near St. Antoine mill is a fixed red light, exhibited from the keeper's dwelling, at an elevation of 105 feet above high water and visible through an arc of 16° on each side of the leading line for a distance of 7 miles, the power of the light increasing as that line is approached. The red light is distant ¾ mile 137° from La Chaine white light, and when in line they lead through the Grande Passe.

Corne Rock.—From a masonry tower, 62 feet high, on La Corne Rock (appearing white seaward), situated on the eastern side of the entrance to Treguier River, is exhibited a fixed light, elevated 38 feet above high water, with red, green, and obscured sectors. The light in the white, red, and green sectors is visible, respectively, 11, 7, and 6 miles.

Mooring buoys.—Two sets of moorings for vessels are laid at the entrance of Treguier River, southwestward of Corne Lighthouse; the buoys are about 300 yards from Tete Jaune red beacon.

Semaphore.—There is a semaphore station on Creach ar Maout Hill nearly a mile eastward of La Chaine Light.

Lifeboat, etc.—A lifeboat and mortar apparatus with other life-saving appliances are stationed at Port de la Chaine.

Pilots.—The pilots of Treguier seldom cruise off the port, it being difficult for their small boats to keep or get to sea with onshore winds. In such a case, a vessel from the westward would do well to secure a pilot at Ploumanac'h; or, if from the eastward, at Ile de Brehat.

Anchorages.—From abreast of the Skeiviec Rock, 1.5 miles within the entrance, to the town of Treguier, the river is deep enough for coasters always to remain afloat. It has three anchorages, well sheltered from wind and tide, of which the best and most convenient is the Palamos anchorage, about 2 miles within the Skeiviec, where the depths are from 2½ to 4 fathoms.

Directions.—In steering through either of the channels for the entrance of the river, keep the leading mark on until the large spire of Treguier Cathedral is in line with the white tower of Skeiviec Rock 207°. This latter mark leads into the river, but, before running in, make sure that the tide is sufficiently high for the vessel to pass over an 8-foot patch, 200 yards outside the ledge bordering the eastern side of Ile d'Er, and also over the Pie Bank on which there is but a depth of 6 feet at low-water springs. After passing between the beacon on the Taureau and the Corne Rock, which rocks are about 1.3 miles within the Petit Pen ar Guezec Buoy (and, between them, the channel is not more than 150 yards wide), and southward of the Taureau Bank red buoy steer up the river keeping midway between the rocks bordering its banks.

At night, vessels entering the Treguier River should steer with La Chaine white light in line with St. Antoine red light, bearing 137°, until la Corne green light is seen, then steer for the latter, keeping within the green sector. Pass a short distance westward of the Corne Rock and anchor within the white sector of light, which marks the inner anchorage.

Tides.—It is high water, full and change, at the entrance of the Treguier River at 5h. 22m.; equinoctial springs rise about 35 feet, ordinary springs 26 feet, and neaps 21 feet above the soundings. Off the town of Treguier, it is high water at 5h. 32m.; springs rise 23 feet, neaps 18½ feet, neaps range 12 feet.

The flood stream, which sets into this river, rounds the northern shore of Ile d'Er until the bank connecting this isle with the main is covered, which takes place at about half flood; it then slackens at the entrance of the river and runs eastward. The rate of the flood within the river is never more than 3 knots; that of the ebb rather less.

In the approaches to the Treguier River, along the plateau des Heaux, des Duono, and de Roc'h Hir, the flood stream commences half an hour before low water by the shore, and ceases 40 minutes before high water. The ebb stream is established 10 minutes later; that is to say, half an hour before high water, when the change in the direction of the stream takes place. Outside the plateaux, the streams change half an hour after high and low water by the shore.

CHAPTER III.

HEAUX LIGHTHOUSE TO CAPE FREHEL.

Plateau des Heaux, composed of rocks, of which many are always above water, is about 1 mile in extent 96° and 276° and 1,400 or 1,600 yards in width. At its northeastern edge is the rock Men Lem, which never covers, and can be passed on its northeastern side at 250 yards distance; at from 1,100 to 1,500 yards eastward and southeastward from the lighthouse are small sunken rocks with only 2 and 2¼ fathoms water over them; on the southeastern edge is Ar Hanap Rock, which always shows and can be passed on its southern side within 100 yards.

Light.—Heaux Lighthouse is a round tower, 159 feet high, erected on the northeast side of Les Heaux Ledge, from which a fixed and occulting white and red light is exhibited at an elevation of 148 feet above high water. The white light is visible 18 miles; red light, 15 miles.

The space covered by the sector of fixed white light is free from danger except Roc'h ar Bel with 20 feet water, and 1,600 yards westward of its east end the Carec-Mingui with only 11 feet at low-water springs, and also a small 2-fathom rocky patch situated 1,500 yards east from Heaux Lighthouse. From Heaux Lighthouse, Sept Iles Lighthouse bears 264° 15.5 miles; Roches Douvres Lighthouse, 43° 16 miles; and the lighthouse on Grand Lejon Rock, 120° 19 miles. From it also Paon Lighthouse, at the north extreme of Ile de Brehat, bears 123° 4.8 miles, and the black and white buoy with horizontal stripes, marking the northeastern extreme of the Horaine Ledge, 91° 7.5 miles.

Trieux River and Paimpol approaches—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and red horizontal stripe is hoisted at the signal station or on the vessel escorting submarine vessels to indicate that the latter are exercising submerged, all vessels entering or leaving Trieux River and Paimpol are earnestly requested to make use of the fairway defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the east by a line joining Barnouic Light Beacon and Harbor Isle, St. Quay; on the west by the meridian of Les Heaux Lighthouse; on the south by the coast between Harbor Isle and Les Heaux Lighthouse; on the north by the parallel of Barnouic Light Beacon. The above limits have not been placed on the chart plates.

The coast—Baie de Saint Brieuc.—Between the Plateau des Heaux and Ile de Brehat is the northeastern entrance to the Trieux River, and on the southern side of that island its eastern entrance. Between Ile de Brehat and Cape Frehal, distant 28.5 miles in a 113° direction, the coast line falls back, forming the deep bight named the Baie de Saint Brieuc. The approach to the western entrance of the bay is indicated at night by the fixed white light of the Plateau des Heaux and in the day by Creach ar Maout Hill, about 3 miles 186° from the light. This hill forms the abrupt termination northward of the high land separating the Trieux River from the Treguier. On its summit is a guardhouse, with the semaphore before described close to it.

The bay is on all sides much encumbered by rocks and shoals, both inshore and in the offing. The land is generally high, and may be seen in clear weather when about 22 miles distant. In very clear weather the summits of the central chain of the Bretagne Hills are visible, and, among others, the Mener Bel Air and the Hener Bre. The former rises southward and the latter southwestward of the bay. When bound westward from Cape Frehel the parts first seen are Cape d'Erqui and Bien-Assis Wood on the eastern side, and then Plouha Point and the small town of Plouzec, on the western side of the bay.

The Rade de Brehat, with the ports of Trieux, Paimpol, Portrieux, and Binic, are on the western side of the bay. In the southern part is port Legue and the town of St. Brieuc, with the large shallow Anse d'Yffiniac adjoining; and on the eastern side is the port of Dahouet, notheastward of which is the high and steep point of Pleneuf, which juts out boldly from the land 3.8 miles 320° of Cape d'Erqui. The Verdelet, a conical-shaped islet, lies 400 yards north-northwestward of Pleneuf Point, between which point and Cape d'Erqui the shore is generally low and exposed to the northwest, but the Rade d'Erqui affords good shelter with easterly winds. The hills at this part rise suddenly a short distance within high water mark and unite with the high lands in the interior. Bien Assis Wood, on their summit, may be recognized at a great distance.

Cape d'Erqui is a lofty promontory, terminating in a steep slope on its western face. Between it and Cape Frehel, 7.3 miles eastward, the shore is composed of high rocky cliffs, with the exception of a small sandy beach under the village of Pleherel. The little inlet Bouche d'Erqui lies 3 miles eastward of the cape of that name.

Caution.—As all dangers between Ile de Brehat and Cape Frehel rise from depths of less than 18 fathoms, the prudent seaman will at night or in thick weather keep without that depth. The offlying dangers, Basse Maurice, Plateau de Barnouic, and Plateau des

Roches Douvres are not included in this caution, they being surrounded by much deeper water.

Plateau des Roches Douvres.—This dangerous rocky ledge, the outermost of the offlying dangers fronting St. Brieuc Bay, occupies a space 3.5 miles long 321° and 141° and 2.5 miles wide; from it rises a group of 12 rocky heads which never cover. The highest head of the plateau is about 9 feet above the highest tides, and is in the middle of the group; on it stands a white iron lighthouse 185 feet in height. The northwestern edge of the ledge bears 37° and the southeastern edge 50° about 15.5 miles from Heaux Lighthouse.

For tidal streams in this vicinity, see table on following page and also general description at page 246.

Light.—From Roches Douvres white iron lighthouse, at an elevation of 180 feet above high water, is exhibited a flashing white light visible 20 miles.

NOTE.—On an axis 359°, 179° and for 20° on either side of it, the flashes are divided into two parts by an occultation of short duration, and their intensity decreases a little in proportion as the axis is approached.

From Roches Douvres Lighthouse, Hanois Lighthouse, Guernsey, bears 14° 20 miles; Gautier Rocks on Barnouic Ledge 184° 5 miles; Heaux Lighthouse 223° 16 miles; and Grand Lejon Lighthouse south 22.5 miles.

The lighthouse on Roches Douvres is supplied with life-saving apparatus.

Fog signal.—During thick or foggy weather a bell is sounded.

Table showing the direction and rate of the tidal streams at ordinary springs in the vicinity of the Roches Douvres.

Positions.	Tidal stream.	Time, with reference to high water at St. Malo and Granville.	Direction.	Rate.
		h. m.	°	*Knots.*
338° 12 miles from the Roches Douvres in lat. 49° 18′ N., long. 2° 56′ W.	Beginning of flood	3.55 before		
	Flood	2.25 before	102	2.0
	do	0.35 after	80	3.5
	Beginning of ebb	2.5 after	80	3.5
	Ebb	5.20 after	271	3.0
265° 6.5 miles from the Roches Douvres in lat. 49° 5½′ N., long. 3° 2′ W.	Beginning of flood	4.30 before		
	Flood (maximum)	1.40 before	113	4.5
	Beginning of ebb	1.30 after		
	Ebb (maximum)	5.0 after	265	4.5
In the channel between the Roches Douvres and the Plateau de Barnouic.	Beginning of flood	5.20 before		
	Flood	3.30 before	136	3.0
	Flood (maximum)	2.30 before	136	4.7
	Flood	0.40 before	136	3.5
	Beginning of ebb	0.40 after		
	Ebb	2.0 after	321	3.0
	Ebb (maximum)	3.0 after	321	4.5
	Ebb	4.0 after	316	3.4
East 1 mile from the Roches Douvres.	Beginning of flood	5.20 before		
	Flood (maximum)	3.20 before	136	4.5
	Beginning of ebb	0.40 after		
	Ebb (maximum)	4.0 after	316	4.0
115° 10 miles from the Roches Douvres in lat. 49° 2′ N., long. 2° 35′ W.	Beginning of flood	5.0 before		
	Flood (maximum)	2.30 before	136	4.5
	Beginning of ebb	1.0 after		
	Ebb (maximum)	4.0 after	316	4.0

Plateau de Barnouic.—About 12 miles 57° from Heaux Lighthouse and 26° 8.7 miles from Horaine Rock Lighthouse are the Gautier Rocks, near the middle of the Plateau de Barnouic, a dangerous rocky ledge, about 1.3 miles within its southern edge. The Gautier Rocks uncover 14 feet at the lowest tides and are awash at low water, neaps. The Barnouic Rock, of conical form, bears 68° about 1,500 yards from the Gautier Rocks; it uncovers 23½ feet, covers 2½ hours before high water, springs, and is awash at high water, neaps.

Light.—From a white masonry tower, 49 feet in height, on Barnouic Rock, is exhibited an occulting white light. It is elevated 40 feet above high water and visible 11 miles. The light is unwatched.

This plateau, of which the Barnouic and Gautier are the highest rocks, extends from the Barnouic Rock about ¾ mile eastward, 1.5 miles 186°, 2.5 miles 288°, and 2 miles 321°. The most westerly rocky patches, one of which has only 3 feet water, bear 49° 11 miles from Heaux Lighthouse. There are depths of from 10 to 15 fathoms on parts of the plateau, but the sea at times breaks over its whole extent.

The Roches Douvres and Barnouic Ledges are separated by a channel more than 2 miles wide, carrying a depth of from 20 to 30 fathoms. It should, however, be avoided by sailing vessels, as the streams set with great strength over both ledges. If forced to pass through it, endeavor to keep nearer the Douvres than the Barnouic. A vessel will keep westward of both ledges by not bringing Heaux Lighthouse more westerly than 215°.

Basse Maurice is a small rocky patch in the channel between the Plateau de Barnouic and the mainland; from its shoalest part of 7 fathoms, Heaux Lighthouse bears 243°, distant 6.8 miles; Paon Lighthouse, Ile de Brehat, 201° 6 miles; the guardhouse on Creach ar Maout Hill is in line with the Louet Rock beacon 231°, and Plouha Point is a little open westward of Horaine Rock Lighthouse 174°. Although the least depth on this shoal is 7 fathoms, it should be avoided in bad weather, as a heavy sea runs over it during a weather tide.

Roc'h ar Bel.—This shoal patch of 20 feet lies at the northeastern extreme of the great rocky flat extending 5 miles from the shore which separates the entrances of the Rivers Treguier and Trieux and of which the Heaux Rock forms a part. From it Heaux Lighthouse bears 257° 4 miles, and Paon Lighthouse 177°. Carec Mingui, a rocky patch of 11 feet, lies 1,600 yards westward of the eastern extreme of Roc'h ar Bel.

Heaux Lighthouse, bearing 251°, leads southward of the Basse Maurice and northward of the Carec Mingui and Roc'h ar Bel Shoals, over which dangers the tide, at springs, sets with a velocity of 5 knots.

Extensive rocky ledges, lying in a general easterly and westerly direction, extend 5 or 6 miles eastward and southeastward of Ile de Brehat, and on them several rocky heads dry at low water. The northernmost ledges are the Horaine and Echaudes; the southernmost, Men Mar'h and Ringue-bras; between them are navigable channels leading to Brehat Road. Outside of the rocky limits, and 5.5 miles from the nearest land, Pointe de Plouzec, numerous banks of sand, under the general name of Bancs de Sable, extend 4.3 miles in a 153° direction from their northern end, near the eastern extreme of the Plateau de Men Mar'h; on some of these banks the depth is as little as 2½ fathoms.

Plateau de La Horaine.—This rocky ledge is 1.5 miles in extent, northeast and southwest, and 1 mile wide; it has many rocky heads awash and nearly awash at low water, and one head, the Horaine Rock, about a mile within the northern extreme of the ledge, bearing 99° 6.7 miles from Heaux Lighthouse and 54° 3 miles from Paon Lighthouse, uncovers 22 feet at the lowest tides, and is awash about 2½ hours before high water.

Light — Refuge beacon. — Horaine Light is a group-flashing white light. It is elevated 35 feet above high water, and is visible 11 miles.

The light is shown from Horaine Refuge Beacon, an octagonal pyramid, with a shelter at high-water mark, and a platform 26 feet above; the metal lantern, the top of which is 38 feet above high water, is on the platform.

From Horaine Rock the white pyramid on Ar Morbic Rock is a little open westward of St. Michel chapel, Ile de Brehat; Ste. Barbe windmill is midway between two of the highest peaks of St. Riom Isle; and Paon Point and Roseda lights, Ile de Brehat, are in line bearing 237°.

Basses du Nord are the most northern patches on the Plateau de la Horaine. The shoalest head, with 10 feet over it, lies 33° 1,600 yards from the Horaine Rock; Basse du Nord-est, with 9 feet water, bears 74° 1,500 yards, and Basse du Sud-est, with only 8 feet, lies 1.3 miles 99° from it. For this latter patch the Horaine Beacon is in line with Heaux Lighthouse, bearing 279°. There is a channel ½ mile wide, with depths of from 10 to 12 fathoms, between Basse du Sud-est and the Horaine ledges.

Buoy.—A conical buoy, painted black and white in horizontal stripes, and surmounted by two cone bases together, is moored off the northwestern edge of the Plateau de la Horaine, about 1 mile 6° from the Horaine Beacon.

Plateau des Echaudes lies southwestward of the Horaine, and its highest rock, the Echaudes, uncovers 8½ feet at low-water springs. This rock is near the southern part of the ledge, and from it the guardhouse on Creach ar Maout Hill is in line with the northern extreme of Ile de Brehat 271°; the white pyramid on Louet Rock is on with the southern fall of the hillock on which St. Michel Chapel stands, and St. Barbe Mill is a little open eastward of the summit of St. Riom Isle 203°. Another rock, the Pain de Bray, at the northwestern part of the ledge uncovers only 2 feet, and from it the Chandelier, a large rock off the northwestern point of the Ile de Brehat, is seen between the Grand and Petit Pen-Azen Rocks.

Buoy.— A black conical buoy is moored off the northwestern side of the Plateau des Echaudes.

Pen-Azen Rocks—Turret and buoy.—These rocks lie ½ mile from the northern point of Ile de Brehat; the Grand Pen-Azen uncovers 27 feet and the Petit Pen-Azen 15 feet at the lowest tides. The Petit Pen-Azen has on it a stone beacon turret, colored with black and white bands; a black conical buoy is moored on the northwestern edge of the Pen-Azen Shoal.

Plateau de Men Marc'h.—This plateau is southeastward of the Horaine and Echaudes Reefs, and between them is a channel leading to Brehat Road. It is 3 miles long 57° and 237° and 1.3 miles broad at its widest part; the only rocky head visible at the lowest tides is the Men Marc'h in the southeastern part, which then uncovers 2 feet, and is at all times dangerous on account of the eddies in its vicinity. Numerous shoal patches of from 2 feet near the western edge to 1½ and 3½ fathoms at the northwestern part of the ledge lie westward and northward of this rock.

Buoy.—A red conical buoy, surmounted by staff and triangle, is moored off the northeastern end of the above plateau in a depth of about 10 fathoms.

Plateau du Ringue-Bras is the next ledge southward of the Men Marc'h, and between them is a channel leading to Brehat Road; the plateau is 3 miles long east and west and about a mile wide at its broadest part toward the eastern end. The Basse de l'Ascension, the highest head on this ledge, is near its eastern extreme and has only from 3 to 6 feet over it at the lowest tides.

Directions.—Vessels from the westward bound to any of the ports in St. Brieuc Bay, or to St. Malo or Granville, generally pass between Barnouic and Horaine Ledges. This channel is 7 miles wide, the tidal streams follow its direction, and, as before stated, the Basse Maurice, the only rocky patch in the channel, need be avoided in bad weather only.

A vessel using this channel should steer to pass within 4 miles of Heaux Lighthouse, and, as it is approached, keep it well southward of 119° to avoid the dangers westward of it. When eastward of its meridian, it should not be brought westward of 246° until Paon Rock Lighthouse bears 182°, or at night its light shows white. The vessel is then eastward of the Roc'h ar Bel, and Heaux Lighthouse may be brought to bear 260°, on which bearing it leads between the Basse Maurice and the black and white striped buoy of the Horaine.

From the southeastward a vessel is in the fairway of this channel when Heaux Lighthouse bears 260°, and it is necessary to have it on this bearing before she is abreast of the Plateau de la Horaine; to pass northward of the Roc'h ar Bel, Heaux Lighthouse must be brought to bear 246°. When westward of the meridian of Heaux Lighthouse, and until distant 5 or 6 miles from it, keep the lighthouse bearing well southward of 119° to avoid the western dangers.

Tidal streams.—Between the Plateau de Barnouic and Basse Maurice the flood stream sets 130°, and ceases an hour after high water by the shore at Ile de Brehat. Its greatest velocity, about 4½ knots, is nearly at half flood. The ebb runs in the opposite direction, and ceases about an hour after low water by the shore; its strength is nearly equal to that of the flood. At a mile northward of Heaux Lighthouse the flood sets 108°, the ebb 288°, with about the same strength. Close to the edge of the rocks it is somewhat stronger, running at the rate of 5 knots past the Heaux, over the Roc'h ar Bel, and both round and over the northeastern edge of the Horaine. The whirls and eddies occasionally met with in the channel between the Horaine and Barnouic Ledges are strong but not dangerous; the most considerable are produced by the Basse Maurice.

Trieux (or Pontrieux) River.—Four channels lead into this river, which is tidal as far as Pontrieux, 16 miles above Paon Point Lighthouse; one only, the Grand Chenal or Trieux Channel, is available for large ships at all times by day or night, and neither of the others should be attempted without the aid of a pilot. Trieux Channel is the northern entrance between the Roc'h ar Bel and Horaine Ledges. Small vessels may enter from the westward at any time of tide, by day, through the Moisie and Men du Castrec Channels, and from the eastward through the Ferlas Channel, which later is practicable for vessels of deep draft from half flood to half ebb, but can be used only by coasters at low-water springs.

Depths.—The least depth in the main channel of the river as high as the suspension bridge above Lezardrieux is, at the lowest tides, 4 fathoms; at high-water springs, 9 fathoms; and at neaps, 7½ fathoms. Above the bridge the depths are considerable and the river navigable for small craft as far as Pontrieux, where it is dammed. Everywhere within the entrance above the anchorages, however, the channel is extremely narrow and tortuous.

Buoyage.—The several entrance channels are all well buoyed and beaconed in accordance with the French uniform system.

Anchorages.—Several anchorages in the entrance of this river afford refuge to vessels of deep draft, but they are difficult of access to sailing vessels, especially on the ebb. As the holding ground is bad and the stream rapid in the middle of the river, ships should anchor as near the edge of the mud banks as possible on either side.

Pomelin Road is on the northern side of the river, about 3 miles within Paon Lighthouse, and the marks for the best anchorage, in 5 fathoms and out of the tide, are the old mill on Ile de Brehat, without sails, whitewashed, and with red roof, just open northward of the ruins on Ile Verte, bearing 84°; vessels should moor north and south in Pomelin Road. There are two mooring buoys in the road northward of Moguedhier Red Beacon Tower in a depth of 4½ fathoms. There is also anchorage northeastward of this, near the outer edge of the mud banks, which uncover out a considerable distance; vessels should moor here 276° and 96°.

Another good anchorage in which the streams have not much strength and with room for large ships, is near the edge of the mud banks southeastward of the Ile de Bois, a high steep island close to the western point of entrance to the river, on which stands a guardhouse. The anchoring ground here extends in a southwesterly direction from the line of the beacon turret upon Vieille de Loguivi Rock on with Arcouest Mill, 105°. Anchor in a depth of 7½ fathoms with the two lighthouses at Coat-Mer in line, and Loguivi Guardhouse between the two mills, rather nearer the old mill than the new; moor here also 276° and 96°.

The first anchorage within the river for a vessel of deep draft is near the right bank with Coat-Mer Lighthouses in line, and northwestward of Melus Rock, which lies fronting the customhouse on the Roc'h ar On; a large vessel should not venture beyond this at night, but should anchor the moment Heaux light is shut in by Ile de Bois. There is room for two moderate-sized vessels between Bodic light tower on the heights and Sabot du Sud Rock; also excellent holding ground on both sides of the river out of the strength of the stream southward of Coat-Mer Cove and southwestward of a water mill abreast of the cove.

Lezardrieux, a little port on the left or western bank, on the opposite side to the deep channel of the river nearly 2.5 miles above the customhouse office on the Roc'h ar On, is full of rocks and dries at low water at all tides, though it has as much as 30 feet in the entrance at high water, springs, and 20 feet at neaps. Vessels of light draft are neaped within it for 4 or 5 days, but at its entrance among the rocks there is a bottom of soft mud, on which two or three coasters can ground without being neaped.

Vessels of 6 to 8 feet draft can generally remain afloat between this port and a rocky ledge on the western side of the deep channel. There is room for a small vessel to swing in a depth of 10 feet, with the highest house on the right of Lezardrieux water mill in sight to the left of the jetty end and Coat-Mer Lighthouse in line with Perdrix tower. Vessels bound up to Pontrieux anchor here to wait for sufficient water when they arrive during neaps; or, during springs, to await the aid of a local pilot, without whom no vessel should attempt the difficult passages in the river between this place and Pontrieux. The first of these passages, named Ar-Toul-Tane, is at a sudden turn in the river, 800 yards above Lezardrieux suspension bridge, which bridge spans the river at a height of 108 feet above the lowest tides. The second passage is in the turn of the river under the high land and chateau of Roche-Jugut, 1 mile above which, on its eastern side, the Trieux receives the waters of the little river Leff.

Pontrieux.—The little port of Pontrieux is on the right bank of the river, about ½ mile below the town of that name, and 8 miles above Lezardrieux bridge. It has about 400 yards of quay frontage, all on the eastern side; the berths at the foot of the quay dry about 22½ feet above the level of the lowest tides. The town is built on both sides of the river and has a population of about 2,500. Its trade is insignificant, and is carried on chiefly by coasters of from 30 to 100 tons, though it is possible for vessels of 300 tons to ascend as high as the port. The railway station at Guincamp, on the Paris and Brest line, is about 10 miles distant.

Lights.—On Paon Rock, at the northeastern extreme of Ile de Brehat, from the square tower of a white building 31 feet high, is exhibited at an elevation of 67 feet above high water a fixed light with red, green, and white sectors. In the white, red, and green sectors the light is visible 11, 6, and 6 miles, respectively.

On **Rosedo Hill**, Ile de Brehat, and 1,760 yards 239° from Paon Rock light, a flashing white light is exhibited from the square turret of a building 36 feet high, at an elevation of 90 feet above high water, visible 15 miles.

Paon Rock and Rosedo lights in line indicate the position of the Horaine Rock.

On **La Croix Rock,** on the eastern side of the channel, from a round light tower at 45 feet above high water, is exhibited an occulting white light. The light is visible 11 miles through an arc of 7° on either side of the leading line of the fairway, the light increasing in power toward the line.

On **Bodic Heights,** from a square white tower at an elevation of 176 feet above high water, is exhibited an occulting white light. The light is visible 15 miles through an arc of 10° on either side of the leading line, the power of the light increasing toward that line.

Brodic Lighthouse bears 225° 4,155 yards from that at La Croix. The two lighthouses or lights in line is the leading mark through the Trieux Channel.

Perdrix Tower Light.—From the red masonry beacon tower, 26 feet in height above Perdrix Rock, is exhibited a fixed green light, elevated 15 feet above high water and visible 2 miles.

Coat-Mer.—Within Bodic Light, on the same side of the river, are two fixed red lights. The front and lower light is shown from the keeper's white house on the islet at the extreme of the peninsula of Coat-Mer. It is elevated 39 feet above high water and is visible 4 miles when bearing from 198°, through west, to 18°. The rear and upper light is shown from a square white tower 722 yards 219° from the lower light. It is elevated 150 feet above high water, and is visible 8 miles through an arc of 16° on each side of the leading line, the power increasing as that line is approached.

Directions—Trieux Channel.—The leading mark for the main entrance of Trieux River is Bodic and La Croix Lighthouses in line bearing 225°. This mark leads southeastward of Roc'h ar Bel, Men du Castrec, and Sirlots Ledges, the later having a red bell buoy off its eastern extreme; and northwestward of Horaine, Echaudes, and Pen Azen Ledges the last-named are each marked by a black conical buoy, that off Pen Azen Ledge being situated nearly ½ mile 170° from the Sirlots buoy. On entering the river the above mark also leads southeastward of the red beacon turrets on Vieille du Treou, Rodello, and Kerrannets, and northwestward of the beacon turret on Petit Pen Azen, colored with black and white bands, as well as of all the dangers off Ile de Brehat, including the large pointed rock Chandellier, bordering on the north the entrance to the Kerpont Passage and the black beacon turret of Gosrod at the southern side of its entrance. The Gosrod beacon turret stands on a rock which uncovers about 13 feet, and is only 150 yards eastward of the fairway. The red beacon turret on the Moguedhier is about 300 yards 316° from the Croix Lighthouse.

Having arrived at a position 600 or 800 yards northeastward of the Croix Lighthouse and about the same distance from the Moguedhier red beacon turret haul a little to starboard to pass a safe distance westward of the Croix Lighthouse, after which bring the keeper's house on Coat-Mer Peninsula in line with the square white tower of the inner light 219°, which leads to the inner anchorage between Ile de Bois and Coat-Mer.

By night, enter the river with Croix and Bodic Lights in line, 225°, and when Bodic Light is hidden by Croix light tower, as it will be to an eye 8 feet above the sea, when it is 1,800 yards distant from the latter, open out Bodic Light westward of Croix Light and pass La Croix on its western side. Afterwards proceed with the two inner fixed red lights in line, 219°, to the anchorage of Coat-Mer.

Moisie Channel commences at the Moisie red beacon turret near the Sark Rocks, and joins the Trieux Channel near the red turret marking the Vieille du Treou. The flood stream, at springs, sets through at 4½ or 5 knots in the direction of the channel until near the southwestward toward Ile St. Mode. The ebb is not quite so strong and takes more the direction of the channel as the tide falls. The leading mark is the spire of St. Michel Chapel, Ile de Brehat, on with Rosedo white beacon tower, 160°. The channel is very narrow, but is convenient for vessels of moderate length and draft entering the River Trieux with a scant wind.

Men du Castrec Channel has its entrance between the Shoals Ar Mesclek on the west and Men du Castrec on the east, and joins the Trieux Channel at the same point as the Moisie. The tidal streams run at the rate of 4½ or 5 knots, but follow the direction of the channel. The leading mark, the white pyramid on Arcouest Point in line with the red beacon turret of Vieille due Treou, 176°, leads through in midchannel until near the latter, but over the eastern head of the Shoal Ar Gazec, on which the depth is only 6 feet at low water, springs. As with the Moisie Channel, this passage is used by vessels which can not weather the Men du Castrec and Sirlots Shoals, not only in entering the Trieux River but also in making for Brehat Road by the Kerpont or Brehat Channels.

Submarine cable.—A submarine telegraph cable crosses the channel from a point about 670 yards northwestward of Arcouest Point. The shore end is marked by two beacons painted with white and blue horizontal bands and having circular white topmarks.

Ferlas Channel.—This channel is available by day for vessels of 8 feet draft at low water, springs; for vessels of 13 feet draft at low water, neaps; and for vessels of deeper draft at half tide; see rise of tides, page —. To run from Brehat Road into Trieux River through this channel with the best water, weigh when the rock at the southwestern point of Logodec Islet has just covered; it uncovers 22 feet at the lowest tides. Steer westward to pass midway between the black and white beacon turret on the Piliers and the red and white turret on the Vif-Argent Rocks, and toward the Rompa red and black beacon turret, passing 100 yards northward of the summits of Rouray (western head whitewashed), Conan, and Levret Rocks, which latter border the southern side of the channel and never cover; and southward of the Rout ar Linen red beacon, of the Trebeyou red turret, and of the Rompa beacon turret, which latter, however, may be passed on either side at the distance of 100 yards. This track passes over, or close to, several patches of from 3 to 6 feet at low water, springs. After passing Rompa beacon bring it and the Piliers beacon turret in line, and this mark leads into the Trieux Channel, southward of the Tranquet Rock and of the Vieille de Loguivi red and white beacon turret, and up to the direction of the two lighthouses of Coat-Mer in line.

There is a passage connecting the Ferlas and Trieux Channels eastward of the Tranquet and of the black beacon tower on Vincre Rock (or Trou-blanc), named the Vincre or Trou-blanc Channel. The leading mark through is Heaux Lighthouse, bearing 347° in line with the most easterly rock of those which lie northeastward of the Ile a Bois, on the Trou-blanc, named the Trou-blanc Channel. The leading mark through is the new mill of Loguivi, kept on astern between the Conan Rock and the steep declivity of the northern point of Gouern cove 170°. There are also other intricate channels connecting the Ferlas and Trieux Channels.

Loguivi.—Near the western entrance of the Ferlas Channel is the little fishing port of Loguivi, useful to pilots and fishermen, but of no importance. Cren Rock, on the western side of its very narrow entrance, has a red beacon on it. The harbor dries from 6 feet at the entrance to 22 feet within at low water, springs.

Pilots.—The Brehat and Trieux pilots keep at sea when the weather permits, and in fine weather may be found cruising or fishing as far seaward as the Roches Douvres. Fishing boats are often found near Heaux Lighthouse, and their masters are generally good pilots and very useful until proper pilots are met with. If a vessel is bound to Pontrieux, or anywhere above the Ile de Bois roadstead, a river pilot is required. The headquarters of these pilots is at Lezardrieux.

Tidal streams.—The tidal streams off the entrance of the Trieux River have been already mentioned. Within the entrance, between St. Mode Isle and La Croix Lighthouse, they follow the direction of the channel, but outside or northeastward of St. Mode they cross the channel with great strength, and a sailing vessel requires a fresh, fair wind to enable her to keep the leading marks on. For time and rise of tides at the entrance of the Trieux River see tides around Ile de Brehat.

Ile de Brehat.—The southwestern point of this isle is less than a mile from Arcouest Point on the mainland, and it extends from thence 2 miles in an 18° direction to Paon Point, but is nearly divided into two parts about its center. The most conspicuous objects on it are the lighthouse at Paon Point and on the little mound of Rosedo, St. Michel Chapel, the northern mill (without sails), and the southern mill (le Vieux Moulin, also without sails), which has a red roof and is whitewashed. The most remarkable irregularities of outline are at Paon Point, at the small hill where the chapel stands, and at the hillocks crowning both points of entrance to Port Clos. The isle appears distinct from the coast on a southerly, southwesterly, or northerly bearing, but unless very near it becomes blended with the land when bearing between 231° and 299°. The white pyramids placed on the Ar-Morbic, Louet, and Quistillic rocks, which front the eastern part of the isle, are also conspicuous objects and may be seen at some distance.

Ile de Brehat, with a population of over 1,000, mostly hardy fishermen and sailors, has the small ports of Corderie, Clos, and Chambre, on its northwest, southwest, and southeast sides, respectively; the first is entered from the Trieux Channel, the last two from the Rade de Brehat.

The dangers already described surrounding this isle seaward are comprised between the lines of Heaux Lighthouse bearing 254°, and the mill on the high land a little northward of Pomelin Bay on with the southwestern point of Ile de Brehat 288°. The tidal streams, especially at springs, rush with great velocity through this chain of dangers, and produce a violent race, which, at low water, can only be passed through without risk by the narrow cut called the Brehat Channel, which is 2 miles long in a 170° and 350° direction, passes about a mile eastward of Paon Point, between the rocky ledges fronting the eastern side of the isle and the Plateau des Echaudes.

Semaphore.—There is a semaphore station on Ile de Brehat on the highest part of the island, about 260 yards southward of the lighthouse on Rosedo Hill.

Lifeboats are stationed at Paon Point and at Port de la Corderie, Ile de Brehat.

Port de la Corderie, on the northwestern side of Ile de Brehat, is a grounding place where vessels of moderate draft find shelter, and at this little port is the Government store of buoys, moorings, etc. Its entrance, on the eastern side of the Kerpont Channel, is only 100 yards wide and open to the westward; it lies southward of Kervarec Rock, and of a rocky ledge marked by two black beacons. A red beacon marks the edge of the rocks on the southern side.

There is a warping buoy at 55 yards southward of the pier.

Depths.—In the channel the harbor dries from 5 to 9 feet at low water, springs; there is a depth of from 26 to 22 feet at high water, springs, and from 18½ to 14½ feet at neaps.

Vessels lie aground on a bottom of mud and sand from the entrance to the head of the port. The best berth for vessels of about 15 feet draft is 400 yards within the entrance. Small coasters lie eastward of this position, and sometimes in the middle of the little cove at the head of the port, where there is from 5 to 6 feet less water than in the channel.

Port Clos, on the south side of Ile de Brehat between the southern entrance of Kerpont Channel and Brehat Road, dries throughout at low water, and although difficult of access, affords refuge to coasting vessels capable of taking the ground, having within the causeway described 20 feet at high water, springs, and 12 feet at neaps.

Men Allan, a rock at the entrance of this port, marked by a black and white beacon, lies near low water mark and uncovers about 19 feet; another rock about 100 yards farther in, with a black beacon on it, also uncovers 19 feet. A causeway from the western shore shelters the inner part of the port. At the foot of the causeway the bottom dries 1½ feet at the lowest tides; the best berth is 100 yards 6° of the rock at the end of the causeway, where it dries nearly 11 feet. Most vessels, however, lie outside the causeway, about 100 yards 141° of the rock; the grounding places here are good, but anchors have little hold, and at high water it is exposed to winds from between 231° and 141°.

Port la Chambre.—If surprised in Brehat Road by strong easterly winds, a vessel that can take the ground will find good shelter in Port la Chambre, between the southeastern part of Ile de Brehat and Logodec and Lavrec Islets. It dries at low water, and its principal entrance, about 100 yards wide, is between the rocks at the southeastern point of the isle and those adjacent to the western side of Logodec.

A vessel can not proceed farther into this port than the large islet lying abreast of the northern end of Logodec, which divides the channel into two branches. The best berth is about 150 yards southward of that islet, where the bottom dries about 9 feet, and where the depth is 22 feet at high water, springs, and 14 feet at neaps. A clump of trees surrounding Ste. Barbe Chapel, Paimpol, bearing about 185°, and touching the eastern side of a large rock named the Chateau, just westward of Ile Blanche de l'Arcouest, leads to the entrance.

Rade de Brehat, on the southern side of Ile de Brehat, is the only place between Heaux Lighthouse and Cape Frehel in which vessels of moderate draft can find shelter during strong winds from 6° to 321°. The best holding ground trends along the line of the white guardhouse upon Ile de Bois on with the southern face of a high rock named Men ar Vran, bearing 268°; its eastern limit is the eastern end of Mets de Goelo Islet on with Men-Gam Rock, marked by a beacon turret with black and white horizontal bands and black top mark, denoting the point of separation of the Ferlas and Lastel Channels and its western limit, Ste. Barbe mill on with La Trinite Point 178°.

The best berth is with Ste. Barbe mill, or the trees of Ste. Barbe chapel, in line with the summit of Ile Blanche de l'Arcouest about

189°. This chapel is on the high land at the head of Paimpol Bay, 300 yards westward of the mill. The least depth in the road at low water, springs, is 3 fathoms, and the holding ground is good. A vessel should moor E. by S. and W. by N. There are two mooring buoys in Brehat road, off the south entrance of the Kerpont Channel.

Directions for approaching Rade de Brehat from the westward or northward.—If wishing to seek shelter in this road from strong winds between NW. by N. and N. by E. when pilots are not to be found in the offing, wait if possible N. by E. of Heaux Lighthouse until half flood, when the tide will have risen in the vicinity of Ile de Brehat about 18½ feet. At this time a vessel may run through Brehat Channel into Brehat Road without risk, for the channel, which is only 400 yards wide at low water, is then ½ mile in width.

Chenal de Brehat.—Having rounded the Roc'h ar Bel Ledge, the leading mark through Brehat Channel is the white pyramid beacon on the Cormorandiere Rock in line with the white beacon tower at Port Moguer, near Plouha Point, bearing 169°; this line leads 1,200 yards westward of the Pain de Bray Rock and leaves the whole Plateau des Echaudes on the port hand, passing its nearest rock, the Cadic, which has 15 feet on it at low water, at 250 yards. It also leaves on the starboard hand, the Roc'h ar Bel at 800 yards, the Men du Castrec at 1,600 yards, and the Pen Azen Rocks at 800 yards. Until southward of Paon Point both flood and ebb streams set strongly across the channel, as they do again when Ferlas Channel opens, but under cover of Ile de Brehat the streams take the direction of the channel. Follow the leading mark given, leaving the red buoy with conical top mark of the Roc'h Guarine on the starboard hand until the red tower on Men Garo Rock comes in line with the white pyramid on Quistillic Rock, then haul more to the westward and bring the Piliers beacon turret on with a whitewashed rock on the mainland westward of Arcouest Point, bearing 241°. This latter mark leads into Brehat Road, passing 150 yards southeastward of the Basse de Men Garo, a small patch on which there is a depth of about 26 feet, and 200 yards northwestward of the Cain ar Rat, a 6-foot patch on which there is 23 feet at half tide.

Entering Chenal de Brehat from Men du Castrec or Moisie Channels.—Sailing vessels rounding Roc'h ar Bel from the westward, with wind and tide from that direction, are liable to be set eastward of the entrance to the channel and run a risk of being thrown on the Horaine or Echaudes Ledges; and to those leaving the channel with easterly winds during the ebb there is similar risk of not being able to weather the Roc'h ar Bel and other shoals on the western side.

In the former case, and to avoid this risk, vessels pass inshore of Roc'h ar Bel through the Moisie or Men du Castrec Channels and, crossing the Trieux Channel, proceed to Brehat Road either by the Kerpont or Brehat Channel.

In taking the Men du Castrec Channel with this object the leading mark as already given is the white pyramid on Arcouest Point in line with the red beacon turret on the Vieille du Treou 175°; this line should be held only until the Moisie beacon turret is on with Heaux Lighthouse 289°, and then this latter mark astern leads between the Sirlots and Men du Castrec Ledges, northward of Pen Azen Ledge, into the Brehet Channel. From half flood to half ebb vessels of 14 feet draft may run through this passage without any risk. With the wind between NW. by N. and SW. by W., and even at low water, pilots use it not only for vessels bound to Brehat Road but also for those bound to ports in St. Brieuc Bay.

If taking the Moisie Channel the leading mark through is the spire of St. Michel Chapel, Ile de Brehat, in line with Rosedo white beacon tower 160°, but as this channel is very narrow the services of a pilot are indispensable. As Vieille du Treou beacon turret is neared the mark should be opened a little, as it leads very close to that beacon, cross the Trieux Channel in the direction of the entrance to the Kerpont Channel, and proceed through that channel by the directions following.

Kerpont Channel.—This channel separates Ile de Brehat from Ile Beniguet and leads into Brehat Road, but is only practicable for vessels of moderate draft after four hours' flood, when that stream begins to slacken. A rocky ledge which dries 9 feet, named Le Pont, connects the two islands; at high-water springs there is a depth of 22 feet, and at neaps of 14½ feet over it. Here the tide at its full strength runs 6 knots. The leading mark through is the white pyramid on Arcouest Point, seen in the middle of the space between the high rocks bordering each side of the channel, bearing 175°, which mark may also be used for the Men du Castrec Channel. The Kerpont Channel is practicable for vessels drawing 14½ feet so long as the Vieille du Treou Rock is covered, the least depth in the Kerpont at that time being 16½ feet.

The Kerpont has two outlets to the southward; one, midway between the southwestern point of Brehat and the Noires Ledge, marked by a red beacon turret on the Petite Pierre Noire, its northern rock, and by a red beacon on the Grande Pierre Noire, its southeastern rock, which uncovers 17 feet. The other outlet is between this ledge and the large rocks off the eastern side of Raguenezbras Isle, marked on their southeastern edge by a beacon on a rock which uncovers 19 feet at low water. The leading mark for this passage is the rock Beg ar Raz, on with the westernmost house of Brehat.

Approaching Rade de Brehat from eastward and southeastward.—The channels by which the road can be entered from the eastward are not much used, as the tidal streams cross them obliquely, but there is sufficient water for vessels of deep draft even at low water.

The first channel eastward of Brehat Channel is that between the Horaine and Echaudes Ledges to the northward, and Men Marc'h Ledge on the south. The leading mark through is the summit of the high rocky islet Menou, ½ mile eastward of La Trinite Point, on with the two mills of Lande-Blanche 215°. The mills are nearly in line from this direction. Follow this mark until Arcouest Mill is in line with a large forked rock lying close northwestward of Ile Blanche de l'Arcouest 248°, from whence a direct course may be steered for the road; or the Ferlas Channel may be run if bound for the Trieux River.

The next channel to the southward is between Men Marc'h and Ringue-bras Ledges; the leading mark is the highest point of St. Riom Isle, in line with Lande-Blanche Northeastern Mill 226° until Arcouest Mill is on with the large forked rock 248°. With a moderate breeze, the Ringue-bras can be crossed at neaps from half flood to half ebb by keeping Lande-Blanche Northeastern Mill on with the highest point of St. Riom Isle. The Bancs de Sable may also be crossed under the same circumstances of wind and tide by keeping Arcouest Mill in line with the large forked rock, as before described.

To pass southward of the Bancs de Sable, and it is not prudent to cross them at low-water springs, bring the white pyramid on Quistillic Rock between the old mil and St. Michel chapel, Ile de Brehat, 291°; this leads close southward of their southern extreme, a short distance southward of the Basse Pomoriou, on which there is a depth of only 9 feet, and between Cain ar Monse Rock, awash, marked on its western side by a conical buoy with top mark and painted with red and white bands, and a small patch named the Carec Mingui, on which there is only 8 feet at low-water springs. When Arcouest Mill comes in line with the large forked rock, run in as before described.

Approaching Brehat Road from the southeastward, the northern mill on Brehat in line with Quistillic Pyramid, 322°, leads close westward of the highest heads of the Basse St. Brieuc, 1.5 miles off Minar Point and marked by a red buoy on their eastern side. These rocks are awash at the lowest tides. The above mark also leads close westward of the highest heads of the Basse St. Brieuc, 1.5 miles, by a red buoy, a short distance westward of the highest part of a sand bank between this ledge and the Charpentiers Ledge, close northeastward of the Charpentiers Ledge, marked by a red beacon turret, and of the white pyramid on the Cormorandiere Rock. Follow this leading mark until Arcouest Mill is in line with the large forked rock, when proceed as before for Brehat Road.

Tides and tidal streams.—It is high water, full and change, around Ile de Brehat, at 5h. 51m.; equinoctial springs rise about 39 feet, ordinary springs 31 feet, and ordinary neaps 23½ feet above the soundings. In Brehat Road the direction of the stream at the commencement of the flood, or 6 hours before high water, is S.E. by E.; its greatest rate is 2 knots at 2½ hours before high water, when its direction is E. by S.

The stream begins to run to the N.W. by W. a few minutes after high water. Its greatest rate, 1½ knots, lasts from 3 to 4 hours after high water, when its direction varies from W. by N. to W. Winds from E. by S. to S.E. by S. cause a heavy sea in the road during the flood.

The tidal streams are not strong in Ferlas Channel, which is a continuation westward of this road; they follow its direction as long as the banks are uncovered; the eastgoing stream then sets toward Arcouest Point. About 20 minutes before high water an eddy comes from Paimpol Bay, and, after rounding Arcouest Point, it sets with some strength toward the southeastern point of Ile de Brehat, and also crosses the eastern part of Ferlas Channel toward the Kerpont. Its rate decreases about the time of high water, but it regains strength when the ebb stream makes, which latter stream takes the direction of this eddy until the banks are uncovered, when it runs westward in the direction of the channel.

Anse and Port de Paimpol.—This deep bay, formed between the high points of Trinite and Plouzec, is dry throughout nearly its whole extent at the lowest tides. Guilben Point divides the bay into two parts, and northward of this long neck of land are the principal beaching places, and the port of Paimpol, the entrance to which is between the Kernoa Pier, projecting from the southern shore, and the north extreme of the quays on the opposite side. The little river Quinic flows through it and forms a very tortuous channel through the sands of the bay when they uncover.

The Port de Paimpol has undergone considerable alteration through the completion of the second wet dock. (See Appendix.)

Depths.—The port dries throughout. It has a depth of from 13 to 19 feet at high-water springs and only 5 to 11 feet at neaps.

Buoyage.—The entrance to the harbor, as well as the various channels leading up to it, are buoyed and beaconed in accordance with the French uniform system.

The harbor is about 380 yards in length and 250 yards in breadth at its widest part, and the bottom is everywhere soft. There is considerable quay frontage and the berths are good; swell of much importance is very rarely felt. The bottom, however, being above the level of half tide, vessels of any size arriving when the tides are taking off are liable to be neaped for several days. A wet dock, 673 feet long and about 290 feet wide, with the sills of the lock of its entrance 16¼ and 13 feet above the level of the lowest tides, has been constructed on the eastern side of the tidal harbor. Works are in progress for the construction of a second floating basin.

A white flag with blue border hoisted at a mast at the entrance to the wet dock signifies that the lock gates are open.

A small fixed red light is exhibited from a pole at the end of Kernoa jetty.

Dock.—At the northern end of the wet dock there is a dry dock, 230 feet in extreme length, 187 feet on blocks, and 36 feet wide at entrance, having a depth on sill of 14½ feet at high water, ordinary springs.

The town of Paimpol has about 1,500 inhabitants. It has the advantage of railway communication with the main line from Paris to Brest by means of a short direct line from the town to Guincamp, on the main line, and is a place of some importance from its extensive deep-sea fishery, which employs about 40 or 50 schooners of from 120 to 200 tons.

A lifeboat is stationed at Paimpol.

Beacons, etc.—The Bay of Paimpol is easily recognized from seaward; on its northern side, by Arcouest Point, with a guardhouse on its summit and its white pyramid beacon, northward of Point de la Trinite, and by St. Riom Isle, 121 feet high, rocky, and with indented summit; on its southern side by the island Mets do Goelo, 1.300 yards northeastward from Plouzec Point, high and with rounded grassy top sloping abruptly to the sea on all sides, with Ost Pic Lighthouse at its eastern end: and Torel, a little sugar-loaf islet, between it and Plouzec Point; while marking the offlying reefs in the central part of the bay are the Cormorandiere white pyramid and the two beacon turrets marking the Charpentiers (with tide scale showing height of rise above soundings given on chart) and Gouayan Rocks, the former red, the latter black.

Anchorage.—There is anchorage both southwestward and southeastward of St. Riom Isle, in the narrow channel separating the mud banks of Paimpol Bay from those which dry at the southern end of this isle. There are two beacons on the Plateaux des Fillettes, westward of St. Riom—the northern black, the southern red. A vessel will have a good berth by mooring north and south, southwestward of the isle, in a depth of 4 fathoms, muddy bottom, with the guardhouse on Arcouest Point in line with eastern extreme of Trinite Point; and, the white pyramid on the Cormorandiere Rock between the red beacon on the Denou Rock and the northwestern rock of the Roho Ledge. There is not much sea here, even during strong easterly winds, except at high water.

The holding ground southeastward of St. Riom Isle is good, but the anchorage is more exposed to easterly winds. It lies in the direction of the black beacon on the Ar-zel Rock in line with the summit of Ile Blanche de Guilben, 242°; its northeastern limit is Heaux Lighthouse, just opening out from behind Arcouest Point; and its southwestern limit the guardhouse on Minar Point, a little open eastward of Plouzec Point.

Beaching places.—The best grounding places in this bay are in front of Port Paimpol, northward of Guilben Point, and those most used are on the flat between the channel and the rocks bordering the shore from the port to the point. The bottom is mud and sand, and dries about 16¼ feet. The sea is rough here at high-water springs, when it blows hard from the eastward, but the bottom is soft, and the sea goes down before a vessel takes the ground.

There is also a good beaching place between the extreme of Guilben Point and Ile Blanche de Guilben. The best berth is about 300 yards northward of the isle, where the bottom is soft mud and is about 10 feet above the level of the lowest tides. Another good position, where vessels lie up during the winter, is in the northern part of the bay in front of the hollow in the shore under the high coast of Lande de Portzdon. At this place a vessel drawing 10½ feet will be neaped only one day.

Port Lazo, also in the southeastern part of Paimpol Bay under the highland of Plouzec Point, is a good position to beach a vessel of moderate draft. The berths do not dry more than 9½ feet and are well sheltered.

Lights—Portzdon.—From the gable end of the keeper's dwelling on Portzdon Point, on the northern shore of the bay, ¾ mile from the entrance to Paimpol Harbor, is exhibited at an elevation of 35 feet above high water a group-occulting white light with red and obscured sectors. In the white sector it is visible 9 miles; in the red sector 6 miles.

A small fixed red light is shown from the end of Kernoa Jetty constructing at Paimpol Harbor.

Ost Pic.—On the Ost Pic Rock at the eastern end of Mets de Goelo Island, on the southern side of Paimpol Bay, from a square white tower 44 feet high and at an elevation of 64 feet above high water, is exhibited an occulting white light. The white light is visible 12 miles; the red light 8 miles.

Semaphore.—There is a semaphore station on the summit of Plouzec Point which may be seen from a great distance seaward.

Channels leading to Anse de Paimpol.—There are five channels leading to the anchorages near St. Riom Isle, viz. the Trinite, Lastel, St. Riom, Denou, and Jument Channels. They are all difficult of access, lying in the midst of the dangers by which Paimpol

Bay is surrounded in all directions; and of the five two only, the Denou and the Jument, are, after half flood, practicable without a pilot.

Trinite Channel, the entrance to which is southward of Brehat Road between the Piliers Rocks and those off the northern end of Ile Blanche de l'Arcouest, is generally taken by vessels bound to Paimpol in charge of pilots, who have conducted them through the Moisie or Men du Castrec and Kerpont Channels. It unites with the Lastel Channel ½ mile northward of Trinite Point.

Lastel Channel is a narrow passage southward of the Men-Gam Rock and of the rocky ledge extending from the southern end of Ile Blanche de l'Arcouest. Pilots generally take vessels to sea from Paimpol through this channel.

St. Riom Channel is the narrowest of all, and is but seldom used. It is close to the northwestern side of St. Riom Isle, between it and the Vras Rock.

Denou Channel is just eastward of St. Riom Isle, between Garap and Rohan Hier ledges. It carries a depth of 19 feet and has the advantage of lying in the direction of the flood stream, but it is narrow, and, including the space which separates it from Ile de Brehat, can only be navigated by the aid of a good local pilot and with a fair wind. After half flood, if the leading mark can be seen, a vessel may run through without risk.

Jument Channel.—The entrance to this channel is about 1.3 miles northward of Plouzec Point, between two large and remarkable rocks 1 mile apart in a north and south direction; the one is the Ost Pic, already mentioned, at the eastern extreme of Mets de Goelo Island, on which stands the lighthouse; the other, at the southeastern edge of the Roho Ledge. The channel has only 5 feet at lowest tides, but at half flood there is a depth of 22 feet on the bank extending from the southern part of the Roho Ledge to the Jument Rock.

The Jument, Gueule, and Gouayan Rocks divide this channel into two parts, both of which are practicable for vessels of moderate draft. The Jument uncovers 7½ feet, the Geule 3 feet, and the Gouayan 16 feet at the lowest tides. The Jument and the Gouayan have beacon turrets on them, the Jument being painted with red and white bands and the Gouayan black; the Guele lies midway between beacons, about half a mile east-southeast of the Jument, and is marked on its northern side by a black buoy with cylindrical top mark.

Directions—Denou Channel.—If bound to Paimpol Bay from the northward, through the Brehat Channel, and intending to run through the Denou Channel to the anchorages under St. Riom Isle, to the harbor of Paimpol, or to any of the beaching places in the bay; having passed through Brehat Channel by the directions already given steer 195° with Rundavi Mill (no roof or rails, colored white) in line with the red beacon on Denou Rock, which rock is only about 500 yards 96° from the eastern point of St. Riom Isle. Pass within 25 yards westward of this rock as the Basse du Denou, nearly awash at low water, is but 60 yards westward of it, leaving a channel only 50 yards wide through which the tide runs with great strength. Having passed the Denou, the black beacon on Ar Zel Rock in line with the summit of Ile Blanche de Guilben 243° leads to the anchorage southeastward of St. Riom Isle, or the vessel may be steered for one of the beaching places in the bay. The leading mark given, Rundavi Mill in line with Denou Rock Beacon, passes very close westward of La Petite Moisie Black Beacon, the Moisie Rock which does not cover, the Rohan Heir Ledge, and the Guillaume Rocks, of which the western but deepest end touches the line of direction; and, eastward of Lel Done the northwestern rock of Bongreve Ledge, the Garap Ledge and black beacon, the Valve Rock, and the rocks extending eastward from St. Riom.

Jument Channel.—If the Jument Channel be preferred, having run through Brehat Channel, bring Ost Pic Lighthouse in line with the white pyramid on the Cormorandiere 181° and the vessel will pass eastward of the Cain ar Monse Rock. When southward of this rock, or when the guard house on Arcouest Point bears 257°, steer southeastward to bring Plouzec Mill (has neither roof nor sails) on with the eastern fall of Mets de Goelo Islet 195°; this line leads 200 yards eastward of the Cormorandiere Bank. From thence Plouzec Mill in line with Ost Pic Lighthouse, 203°, leads eastward of the Charpentiers Ledge, marked by a read beacon turret, and to the entrance of the channel, for which no leading mark can be given, but pass northward of the beacon turrets on the Gouayan and Jument Rocks and anchor, or steer for a beaching place as before directed.

Approaching from the southeastward, a vessel should pass between the coast and the offlying shoals between Minar and Plouzec Points and between the Ost Pic and the Calemarguiers Rocks by keeping the summit of the large rock at the southeastern part of the Roho ledge in line with the eastern point of Ar Morbic Rock 338°. This rock is on the eastern side of Brehat and on this bearing appears as part of it; the eastern point of Brehat is high, well defined, and is the eastern extreme of land seen to the northward. Give the Ost Pic a berth of about 400 yards in rounding, and from thence steer for the anchorages or grounding places, passing southward of the beacon turrets on the Gouayan and Jument.

At night.—Vessels approaching Paimpol anchorages at night can only enter by the Jument Channel, and if from the eastward or southward must be guided by the red and white sectors of Ost Pic and Portzdon lights in so doing. Coming from the northward through Brehat Channel a vessel should enter the sector of white light shown from Paon Point and keep within its limits until Portzdon white light is seen, toward which she must then steer; Paon Point light will then change to red and finally become obscured; half a mile farther Heaux light will be masked by St. Riom Isle, when the anchor should be instantly let go, and the vessel will be in a depth of about 5 fathoms.

Tides and tidal streams.—It is high water, full and change, at Paimpol at 6h. 0m.; springs rise 31 feet, neaps 23½ feet above the zero of soundings; but the bottom being above the level of half tide, the depth is only 13 feet in the harbor at high water ordinary springs. The flood stream which enters Paimpol Bay, after rounding the southwestern part of Ile de Brehat, sets S. by W. and SE. by S.; but at about four hours' flood its direction is S. by W. and SW. by S., and an eddy begins to follow the windings of the shore from Mets de Goelo toward Arcouest Point. The breadth of this eddy increases rapidly; at one hour before high water it extends to the anchorage southeastward of St. Riom Isle, and at this time, and even after half flood, a vessel running from Brehat Road to Paimpol with a light wind had better pass eastward of St. Riom Isle and even of the Cormorandiere Rock rather than attempt the Trinite Channel, which can only be taken when the wind is sufficiently strong to stem this eddy.

The ebb stream follows the same direction as the eddy on the flood and forms an eddy behind each projecting point of the coast; but as the banks uncover the body of the stream trends more and more toward Brehat, southward of which it divides, one part passing eastward of the isle, the other, after crossing Brehat Road, running through Kerpont Channel and between the islets and rocks westward of it.

The velocity of both streams increases in the narrow channels, but around the Cormorandiere Bank, as well as eastward of Mets de Goelo and of Minar Point it does not exceed 4 knots at springs and 2 knots at neaps.

Grand Lejon is the highest head of a rocky ledge, 1,800 yards in extent, 40° and 220°, nearly midway between Ile de Brehat and Cape Frehel; it is near the southern edge of the ledge, dries 23 feet at low water, and covers 2½ hours before high water, springs. On this head stands the lighthouse, and from it Heaux Lighthouse bears 300° 19 miles, with Paon Point Lighthouse a little open westward and distant 14 miles; Harbor Island Lighthouse 227° 7.5 miles, and Cape Frehel Lighthouse 106° 14.3 miles. From it also the steeple of Plourhan church is in line with St. Quay Point and with the lighthouse on Harbor Isle, and Turquet Mill is on with the most southern of the high lands of Erqui 133°. The Bouillons, shoal patches of from 3 to 15 feet, lie ½ mile northeastward of the lighthouse, and the Basses du Sud-Est, with 2½ fathoms least water, lie 1,600 yards southward of it.

Light.—From a cylindrical masonry lighthouse on Grand Lejon Rock, painted with black and white bands, which is 76 feet in height from base to vane, a fixed and group-flashing white light with red sectors is exhibited at an elevation of 52 feet above high water. A red sector covers the dangers included between Grande Liviere and Rohein Rocks; another covers the dangers included between the Caffa Shoal and the northwest limit of the St. Quay Rocks. On the limits of the sectors the flashes appear white and red in succession.

The flashing light is visible 13 miles and the fixed light 12 miles.

Fog signal.—In thick or foggy weather a bell is sounded.

Petit Lejon.—The highest head of Petit Lejon lies 150° 3.5 miles from Grand Lejon Lighthouse and it uncovers only 9 feet. From it, the northeastern mill of Plevenon is in line with the northern face of Rohinet Rock, 102°; and Turquet Mill is on with the northern part of Lahoussaye Point 125°. There are several patches of from 4 to 6 fathoms nearly in line between the Grand and Petit Lejon besides the Basses du Sud-Est already described; these patches are surrounded by depths of from 9 to 13 fathoms, the bottom hereabouts being rocky and uneven. A patch with 3½ fathoms lies 141° 1,500 yards from Petit Lejon.

Bell buoy.—A black bell buoy with a reflector is moored off the western side of the Petit Lejon.

Tidal streams.—The flood stream sets into the Baie de St. Brieuc from the northwestward and the ebb stream out of the bay in the opposite direction. Among the dangers surrounding the bay, the flood stream makes about half an hour after low water at St. Malo, and the ebb stream half an hour after high water at that port; in the offing each stream is about an hour later. The streams run with great strength in the vicinity of the Grand and Petit Lejon, from 2 to 4 knots, and the sea is heavy in bad weather. Around the Petit Lejon the streams are rotatory, the flood commencing by running westward, shifting through southwest and south at its maximum strength, and finishing at east; the ebb commences in the northeast, acquires its maximums at about north, and ends at northwest.

The coast.—From Pointe de Plouzec Minar Point bears 141° 1.3 miles. Rocks extend 600 yards from the foot of the latter point, which is high and surmounted by a pyramid, upper half black and lower half white, visible many miles seaward; from it St. Quay Point bears 147° 7 miles, and the coast between is steep and inaccessible, except to boats during offshore winds on the beach of Brechech Bay about 1.8 miles southward of Minar Point and on the beach fronting St. Quay village about 600 yards westward of St. Quay Point. Plouha Point, 4.3 miles 158° from Minar Point and 1.3 miles 321° from Bec de Vir, is the highest point in St. Brieuc Bay; it terminates in a perpendicular rocky cliff 330 feet high, visible in clear weather when more than 20 miles distant. Bec de Vir Point is 1.8 miles northward of St. Quay Point, which latter is steep but much lower than the point northward of it.

Taureau Rock—Beacon turret.—The Taureau Rock, which uncovers 33 feet at the lowest tides, lies in the bight between Minar Point and the Mauve Rock, and is marked by a stone beacon turret painted with red and black bands. The white pyramid on the Cormorandiere Rock, open about 6° eastward of Minar Point, leads eastward of it.

The Banc du Chateau, about a mile in length north and south, lies eastward of Taureau Rock, its shoalest head of 5¼ fathoms being 71° 1.3 miles from the beacon.

The Mauve is a large rock off Plouha guardhouse, 800 yards from the shore and 1,600 yards northeastward of the Pommier Rock, which latter is close to the shore and has its top whitened to serve as a day mark. The Mauve never covers, and forms, with other rocks surrounding it, a ledge 800 yards in length northeast and southwest.

The Place de Greve, the Traverse, and the Oiseaux are shoal patches nearly on the parallel of Plouha Point and 1.3 to 2.3 miles from it. The Place de Greve, the shoalest and nearest the shore, carries a depth of 3 fathoms, and from it the southern mill of Plouzec is in line with the center of the Mauve Rock; the other two patches have 5 fathoms over them. Abreast of the Bec de Vir and 1,100 yards from the shore is the northern end of St. Mark Bank, which from thence extends about a mile southward with a least depth of 2¾ fathoms. A wreck lies on the inshore side of the north end of St. Mark Bank.

Anchorage.—The shore between Minar and Plouha Points is clear of dangers, with the exception of those just described, and with offshore winds may be approached within ½ mile. With the wind between northeast by east and south by east, however, a vessel should avoid approaching too near, as the streams set into the bight. If obliged by a calm to anchor, endeavor to do so when the steeple of Treveneuc Church is in line with the Comtesse de Gueredon, a large rock at the foot of Plouha Point, bearing 164°.

Semaphore.—There is a semaphore on the highest part of St. Quay Point, which may be seen some distance seaward over Harbor Isle and the St. Quay Rocks generally.

Roches de St. Quay — Beacon turrets. — This rocky group, fronting the western coast of St. Brieuc Bay abreast of St. Quay Point, covers a space nearly 5 miles long, 310° and 130°, and 2.5

miles wide; from its northern extreme the steeple of Ploucha Church is nearly in line with the rocks terminating Bec de Vir Point 269°, and from the Caffa Buoy at its southeastern edge, 3.5 miles from the nearest land, Etables Church bears 269°, and Roselier Point 175° 4.5 miles.

Harbor Isle, the principal rock, is a large, round, steep, and isolated islet with a lighthouse on it, lying northwestward of the main group of rocks and islets and 1 mile 51° from St. Quay Point. Only 10 or 12 heads cover on this part of the group. The northernmost rock is the Tour de l'eau; it uncovers 6 feet, and is about 1,200 yards northward of Harbor Isle and nearly 400 yards in the same direction from the Madeux beacon turret, which is painted with black and white horizontal bands. Plouha Church steeple, well open northward of Bec de Vir Point, leads clear of the northern edge of the rocks. On the southeastern part all the rocks cover with the exception of the Houesse, the summit of which is 35½ feet above the lowest tides and only covers at the highest springs the Ronde and Longue Rocks, which dry 25 and 26 feet, respectively, and are not covered at high water, ordinary neaps, and the Caffa Rock, which uncovers 2 feet only. The Ronde is marked by a black beacon turret and the Longue by a red beacon turret.

The Caffa, the southeastern head of the group, bears 66° 4 miles from the eastern pierhead of Port Binic. The highest head of the Comtesses Rocks, off Pleneuf Point, on with Cape Frehel, or Etables and Plourcha Church steeples in line, lead southward of it.

Plateau des Hors lies eastward of the principal rocks of the St. Quay group and is separated from them by a channel 600 yards wide, which is bounded on the west by the Petit Aubert, a rock which uncovers 12 feet, and on the east by a patch named Grande Place, nearly awash at the lowest tides. The northeastern rock of the ledge uncovers 4 feet. The marks for it are the Rohein Rock, seen between Turquet Mill and the highlands of Erqui 99°, and the eastern peak of Mener bel Air Hills, on with Pature Point, south.

Buoys.—The following buoys mark the Roches de St. Quay on their eastern, southeastern, and southern sides.

A red bell buoy, surmounted by a reflector, is moored 600 yards eastward of the Plateau des Hors.

A red and white buoy, surmounted by a top mark, is moored nearly 400 yards southeastward of the Caffa Rock.

A spindle buoy painted black, with cylindrical top mark and marked La Roseliere No. 3, is moored 120 yards southwestward of the southwesternmost danger, the Roseliere, a rock which dries 9 feet.

Light.—The lighthouse on Harbor Isle, the principal rock of the St. Quay group, is a square white tower 33 feet in height, from which is exhibited, at an elevation of 49 feet above high water, a fixed white light with a red sector. The white light is visible 11 miles, red light 7 miles.

From the lighthouse, the eastern end of the Bancs de Sable bears 4° 9 miles; Grand Lejon Lighthouse 47° 7.5 miles, and the Petit Lejon Rock 75° 7.8 miles.

Portrieux is in the northern part of Portrieux Bay, ½ mile southward of St. Quay point; the St. Quay Rocks, lying directly in front of it, form a natural breakwater both to the harbor and roadstead. The town contains about 1,300 inhabitants, and, being a watering place, its population is more than doubled during the summer months. The harbor is formed by a stone pier extending from the northern point, which pier also serves as a quay; the harbor is 550 yards in extent north and south, and about half that width.

Depths. — Portrieux is used by vessels capable of taking the ground, and dries 13 feet at the lowest tides, but at high water, springs it has from 26 to 19 feet, and at high water of the lowest neaps, 10 feet; and, consequently, has more water than any other port in St. Brieuc Bay.

A lifeboat is stationed at this port with other life-saving appliances.

Harbor light.—On the pierhead at Portrieux stands a white iron lighthouse, from which at an elevation of 34 feet above high water is exhibited a fixed green light, visible 3 miles.

Portrieux Road, between the St. Quay Rocks and the coast, has good holding ground and sufficient depth for vessels of 14 feet draft. It should not be used, however, with strong easterly winds, except at the lowest neaps, and then only when the shelter on the eastern side of the bay in Erqui road or under Pleneuf Point can not be reached. The anchorage is comprised within the following limits: Hergue and Pommier Rocks in one (the Hergue is a remarkable rock 321° 1,200 yards from St. Quay Point and has a white beacon turret; the Pommier is a similar rock before mentioned close to Plouha Point, and has a whitewashed mark); the Hergue on with the foot of the steep declivity of Plouha Point; Caruhel mill in line with the Four Rock white beacon turret; and Portieux church in line with the center of Portrieux pier. The depths are from 14 to 18 feet between the southern limit and the line of Merlet mill on with the pier head. On this latter line, from west to east, there is a depth of from 10 to 20 feet; and between it and the northern limit, from 11 to 12 feet. The best berth with most water is, with Etables steeple on with the Four Rock beacon turret; and, St. Michael mill and the pierhead in line.

Directions.—Vessels approaching either the roadstead or port of Portrieux from any direction may do so by passing between St. Quay Rocks and the coast, or by rounding the southern end of these rocks, according as tide and wind best serve. The pass between St. Quay

Rocks and the coast, bring the Mouillere red beacon turret in line with Four Rock white beacon turret, about 170°. This mark leads between the northern part of St. Quay Rocks and St. Mark Bank, and should be kept on until the vessel has arrived within 700 yards 40° of St. Quay Point, when Herflux black beacon turret and Longue red beacon turret will be in line and should be steered for to clear the Mouillere Rocks, which uncover 15 feet, until the Four white beacon turret is in line with the lofty spire of Pordic Church, 81°; follow this direction until the leading mark for the southern part of the channel comes on, viz, the Hergue white beacon turret and Pommier Rock in line 317°, passing between the conical black buoy of the Noirs on the port hand and the red buoy marking the Pi Alien Shoal on the starboard hand. In steering with the Four beacon turret in line with Pordic spire, if the vessel is above 14 feet draft, do not wait until the Hergue and Pommier Rocks are in one, but leave that direction the moment the Hergue is on with Plouha Point.

The vessel, if not drawing more than 14 feet, may now either anchor in Portrieux Road, as directed, or, if the tide suits, she may run on 137° with Hergue and Pommier Rocks in line, remembering that this mark leads over the Basse Meridionale de la Rade, a shoal of 6 feet; close to another of 8 feet, 600 yards, 299°, of the 6-foot shoal; and, over the Traverse, a sand bank which trends upwards of 1.3 miles in a 186° direction from the southern part of St. Quay Rocks and on which the least water is 4 feet. When Etables steeple is in line with that of Plourhan 288°; or when Cape Frehel Lighthouse is on with the highest point of the Comtesse Rocks, the vessel may either haul to the eastward with the latter mark on, or steer for Port Binic, avoiding the Ours Seul Rock, which uncovers 9 feet and is 800 yards from the shore, 1.3 miles northward of that port, and 1.3 miles southward of the Four Rock, by keeping the Mouillere red beacon turret in line with the eastern end of the Mauve Rock.

Approaching the roadstead by the southern passage it is necessary to ascertain that there is a sufficient rise of tide to cross the Traverse Bank and other shoal patches just named. The height of the tide by the Ronde and Longue Rocks, which uncover 25 and 26 feet, is a useful indication of the depth on these shoals.

To enter the port of Portrieux the leading mark is Portrieux spire on with the extreme end of the pier. This leaves at a short distance on the port hand the Four, Vache, and Pannerais Rocks. The Vache uncovers 7 feet and the Pannerais 12 feet at the lowest tides.

Mooring buoys.—There are two mooring buoys in Portrieux Road, situated about ½ mile eastward of the pier.

Pilots.—The pilots for Portrieux also take vessels to Ports Binic and Legue: they generally cruise as far seaward as the Lejons. No stranger should attempt the channel between the Roches de St. Quay and the coast or enter either of these ports without a pilot.

Tides.—It is high water, full and change, at Portrieux at 6h. 0m.; ordinary springs rise 31 feet, neaps 23½ feet above the zero of soundings. The tidal streams in Portrieux Road follow nearly the direction of the Hergue and Pommier Rocks in line. At springs the greatest strength of the flood between Harbor Isle and St. Quay Point, as well as among the rocks northward of the road, is 4½ knots. The strength of the ebb is rather less.

Port Binic is less than 3 miles southward of Portrieux, about 5 miles 304° from Roselier Point, and dries from 10 to 20 feet at low water. It consists of an outer and inner harbor, situated at the head of a little bay ½ mile wide and open to the eastward. The outer harbor is formed by the Penthievre Mole which extends 384 yards from the northern point of the bay in a southeasterly direction, its outer portion turning abruptly southward. At its outer end is the lighthouse. The entrance to the inner harbor is between two stone jetties. It is 550 yards in length eastward and westward and has an average breadth of 93 yards. It is sheltered by the Penthievre Mole, though, as the bay is quite open eastward, the swell and sea caused by easterly gales are much felt in both.

Depths.—The outer port dries 10 feet in the entrance at low water. It can be entered by vessels of about 10 feet draft at high water, ordinary neaps, and those of 14 feet can enter it from 1½ hours before to 1½ hours after high-water springs. It affords good shelter, with winds from south round by west to 321° with strong winds from north round by east the shelter is not good. With these winds it is necessary to enter at the top of high water..

The berths at the foot of the eastern inner jetty dry 17 feet, and those near the landing creek at the upper end of the port, 25 feet above the lowest tides; those alongside l'Estacade, the southern jetty, are the highest.

The town of Binic has over 1,000 inhabitants, and its chief industry consists in its deep-sea fishery, several vessels leaving the port annually for the Newfoundland cod fishery.

Lights.—A fixed white light is exhibited from a circular granite tower on the outer molehead at Port Binic. It is elevated 36 feet above high water and is visible 8 miles.

A green light is exhibited on either side of the entrance to the passage into the inner harbor. A red light is shown from the end of the sea wall.

Directions.—When bound to Port Binic, if the wind is between N. by E. and SW. by W. a sailing vessel, with a sufficient rise of tide, may pass between the mainland and St. Quay Rocks; with the wind between N. by E. and E. by S., she can pass on either side of these rocks; but if between SE. by E. and SW. by S., she should keep eastward of them. With strong winds from NE. by N. to E. by N., a vessel should always pass eastward of them, but should not venture so far into the bay until the tide has risen sufficiently high over the broad flats in front of the port, allowing for the scend of the sea, to prevent all risk of striking the ground in crossing them. In entering keep between the jetty and the buoys in the interior of the harbor.

Passing eastward of St. Quay Rocks, which it is generally prudent to do at neaps, if, after rounding their southeastern extreme, it is found that the vessel can not fetch Port Binic, shelter may be sought under Roselier Point, 5 miles southeastward of Binic.

Tides.—It is high water, full and change, at Port Binic at 6h. 3m.; springs rise 30 feet, neaps 22½ feet above the zero of soundings. When the Longue Rock, at the southern part of the St. Quay group is awash, there is a depth of 14¾ feet at the foot of the outer pierhead of Port Binic, 11 feet at the entrance of Port Legue; 12½ feet at the entrance of Port Dahouet, and nearly 23 feet on the grounding places close southward of Roselier Point. When the highest head of the Trahillions Ledge, or the Grand Lejon Rock, cover (they both uncover 23 feet at springs), there are depths of 11½ feet at the outer pierhead of Port Binic, 7¾ feet at the entrance of Legue, and 9½ feet at the entrance of Dahouet.

Anchorage.—Vessels waiting tide to enter either Port Binic or Port Legue can anchor in fine weather abreast of Binic on a bottom of clay mud in about 3 fathoms, with the Pommier Rock and Hergue white beacon turret in line 317°.

The coast rises in height gradually from St. Quay Point to Binic, between which place and Roselier Point it is high and steep, except at Rosaires Beach southeastward of Pordic Point, where boats can always land with offshore winds. The bank bordering the shore dries out 1 mile abreast of Binic and ½ mile at Rosaires Beach. On the bank northward of Binic are several rocks besides the Four and Ours Seul, both already described. Close westward of the Four is Fille Rock, which dries 19 feet, and 400 yards southward of it is Noyes Ledge, which dries 2 feet above the bank.

The Equerrets, Petit Gripet, and Grand Gripet, three small, rocky ledges abreast of Rosaires Beach, are dangerous to vessels borrowing too closely on the shore.

The highest head of the Equerrets bears 85° 1,600 yards from the foot of Pordic Point and uncovers about a foot.

The highest head of Petit Gripet uncovers about a foot and is ½ mile from the mainland, with Martin Rock bearing 158°. The Martin is a high rock which never covers and is near the shore northward of Roselier Point; shoal water extends 300 yards eastward of it.

There is a depth of more than 14 feet water on the Petit Gripet when the eastern extreme of Martin Rock is covered.

The Grand Gripet, with 2 feet over it, bears 1° nearly 1.3 miles from Martin Rock, the summit of which is then a little eastward of the principal house of a large farm on the high land.

Roselier Point, 5 miles 125° from Port Binic, is high and steep on its northern and southern sides, but terminates in a gentle declivity eastward. If a vessel can take the ground, there is excellent shelter close southward of this point on the northern shore of a little bay called Port Aurelle, protected from all winds from the southward, round by west, to northeastward. The bottom, of muddy sand, dries only 3 feet above the lowest tides, so that if of about 14 feet draft she can run for shelter from two hours before to two hours after high water.

Semaphore.—There is a semaphore station on Roselier Point.

The coast between Roselier and Pleneuf Points,, which bear 66° and 246° distant 6.8 miles from each other, falls back to the southward and forms the head of St. Brieuc Bay, in which are Port Legue, the Anse d'Yffiniac, and Port Dahouet. Several dangers front this part of the shore, of which the farthest in the offing are the Trahillions, Basse Herbaut, Trois Tetes, and the Dahouet.

The Trahillions—Beacon turret.—These rocks form a ledge about 1,800 yards in extent east and west at the edge of the bank, which, abreast of Güettes Point, dries more than a mile from the shore at low water springs; the ledge is terminated at its eastern end by a rock which uncovers 23 feet, on which is a black beacon turret, and at the western end by another rock, which uncovers 8½ feet.

Beacon.—Basse Herbaut and the Dahouet Rock are both awash at the lowest tides. A rock with only 3 feet of water lies 46° 300 yards from the Herbaut. The Trois Tetes, lying between the Herbaut and Dahouet Rocks, have only 2 feet over them, and their inner head, called the Armelent Rock, has on it a red beacon.

A vessel will pass outside all these dangers by keeping the summit of Cape d'Erqui open northward of Petit Verdelet Islet about the width of that rock, or by keeping Rohinet Rock off Cape d'Erqui on with the highest head of the Jaunes Rocks, off Pleneuf Point, 46°, and, 200 yards westward of the Trahillions, by keeping the spire of the church of St. Pierre at St. Brieuc, or the mill near the church, in line with the houses of Sous-la-Tour, a little hamlet in front of Cesson Tower, at the foot of the high land which forms the southern side of the entrance to the Gouet River.

Legue or Port de St. Brieuc is about a mile within the mouth of the Gouet River, the entrance to which is 1.3 miles southward of Roselier Point and between Chatern and Cesson Points, the latter being the northwestern extreme of Yffiniac Bay. Legue owes its importance to the proximity of the large town of St. Brieuc, only a mile distant, and with a population of 16,500. St. Brieuc is in direct railway communication with Paris and Brest, and also with the Morbihan coast line.

The port extends to the bridge above the town of Legue and has over 1,600 yards of wharfage, besides a wet dock 325 yards in length, with an average width of 71 yards and a depth of 20 feet at springs; there are also two careening slips 230 and 131 feet long and 164 and 98 feet wide, respectively. There is a new wet dock at Port de St. Brieuc. A considerable traffic exists at certain seasons between this place and the Channel islands.

Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the Baie de St. Brieuc are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the east and south by the coast between Cape Frehel and Harbor Isle, St. Quay; on the north by a line joining Cape Frehel and Grand Lejon; on the west by a line joining Grand Lejon and Harbor Isle. The above limits have not been placed on the chart plates.

Coal.—About 33,500 tons of coal is imported annually, and about 1,500 tons is usually kept in stock.

Depths.—The bottom between Cesson Point and Sous-la-Tour Hamlet dries 15 feet, the berths at the foot of the quay 20 feet, and those near the bridge 22 feet, above the lowest tides. There is a depth of 16 feet in the entrance at high water, springs, and about 8 feet at neaps.

On the summit of Cesson Point are the ruins of Cesson Castle, of which the tower serves as a landmark and can be seen from a distance of 15 miles. From a little northward of Chatern Point, the channel into Port Legue is marked by beacons and buoys, red on the northern and black on the southern side.

Light.—A fixed white light, visible 8 miles, is exhibited at an elevation of 43 feet above high water, from a circular white tower on Aigle Point, at the northern side of the entrance of Port Legue.

Banc de Chatern and Galettes Rocks are the only dangers to be avoided when entering Port Legue. The bank trends in a 75° direction from Roselier Point and rests upon Chatern Point. The Galettes is a small ledge which uncovers 10 feet, at the distance of 600 yards eastward of Cesson Point.

Directions.—When bound to Legue, if from the westward follow the directions previously given, until southward of the St. Quay Rocks; or, if from the eastward, those given hereafter until past the Rohein Rock; then steer to bring Roselier and Cesson Points in line 192°, which will be the leading mark until within 2 miles of Roselier Point; then steer toward Pature Point until the northern tower of the church of St. Michel, at St. Brieuc, is seen between the southern tower of the same church, on which there is a telegraph, and the most southerly houses of Sous-la-Tour Hamlet, which mark leads to the entrance of the port. Vessels before bearing up for the port should carefully estimate the depth of water over the sands in its front by observing the height of the tide at the Longue Rock, or at Martin Rock. When the eastern head of the latter is awash, there is only 3 feet water in the channel from off Point Aigle to Sous-la-Tour Hamlet; when the next head to this is awash, there is a depth of 7½ feet at the same place; and, when the Longue Rock is awash, there is 11 feet.

Anse d'Yffiniac.—This deep bight, between Cesson and Pature Points, is choked by sands over which the tide flows at high water, but which are uncovered for miles at low water; a good mark for their outer edge is, a line drawn from Martin Rock to the Trahillions beacon turret; and, to keep well outside this edge, the mark is, Bien Assis wood open northward of the old semaphore of Dahouet.

Dahouet.—The entrance to this little inlet bears east 5.7 miles from Roselier Point, and is 1.3 miles southwestward of Pleneuf Point; it lies between the eastern shore and the pier head, and there is also a red beacon light turret on the Petite Muette Rock in the entrance, to be left on the starboard hand. The port is open to the northwest, but affords fair shelter to small vessels which can take the ground. The trade is chiefly with the Channel Islands, but is inconsiderable. There is about 300 yards of quay frontage, and the village consists of 30 or 40 houses, with about 200 inhabitants.

Depths.—The bottom dries 13 feet above the level of the lowest tides abreast the pierhead: 18 feet in front of the western part of the quay; about 22 feet at the angle of the quay; and 24 feet near the mill sluice at the head of the port. At high water, springs, there is a depth of 19 feet abreast the pierhead, and 10½ feet at neaps. When the Longue Rock is awash, there is 12½ feet water at the entrance; when the Bignons des Jaunes are awash there is 10½ feet, and when the highest head of the Trahillions covers there is a depth of 9½ feet.

Harbor light.—From the red beacon turret, 67 feet in height, on the Petite Muette Rock, at an elevation of 25 feet above high water, a fixed white light with green, red, and obscured sectors is exhibited.

The white, red, and green lights are visible 6, 3. and 3 miles, respectively.

The principal dangers in approaching the port from the northward are, the Bignons des Jaunes, the Godiche, and the Dahouet Rock.

The Bignons des Jaunes are at the southwestern edge of the Plateau des Jaunes, and uncover 24 feet; when they are awash there is plenty of water over the Godiche, 6 feet off the entrance of the port, and 4 or 5 feet at the grounding berths within.

The Godiche is a small patch of 6 feet ½ mile westward of the Bignons, with the Petit Bignon a little open southward of the summit of the Jaunes.

Dahouet Rock—Buoy.—This rock is 1,600 yards northwestward of the entrance of the port, and is awash at low water, springs; it is marked by a red spindle buoy on its northern side. Should the buoy be gone, the small steeple of Pleneuf seen over the downs, and open about 6° northward of the steep coast, northward of the point, leads northward of the rock.

Tides.—It is high water, full and change, at Port Dahouet at 6h. 5m. Springs rise 32 feet, neaps 23½ feet, above the zero of soundings. Springs rise at the foot of the western part of the quay from 16 to 20 feet, neaps from 5 to 6 feet.

Directions.—When bound to Ports Binic, Legue, or Dahouet from the westward, follow the directions previously given for passing between the Barnouic and Horaine Ledges, or, for passing through the Brehat Channel, also previously described. If from the eastward, follow those given hereafter until past the Rohein Rock.

If the Brehat Channel is taken, when Paon Point and Heaux Lighthouses are in line 305°, haul to the southeastward and steer with this as the leading mark until the two mills of Lande Blanche are on with Demenez Isle 250°; the vessel is then about 1 mile westward of the Bancs de Sable, and a 147° course leads between the St. Quay and Rohein Rocks, passing about 1 mile eastward of the red bell buoy of the Plateau des Hors.

When southward of the St. Quay Rocks, a vessel may haul up for Binic or steer for Legue as already directed. If for Dahouet, when southward of Rohein Rock which bears 329° 4.7 miles from the entrance of the port, the only dangers to be avoided are the Bignons, the Basse Godiche, and the Dahouet Rocks, already described.

With the wind between southwest by south and southeast by south a sailing vessel should always pass eastward of the Horaine, in rounding which take care not to be set too far eastward by the flood. When southward of the Grand Lejon and to avoid the Petit Lejon, do not open the summit of the Comtesses westward of the southern extreme of Bien Assis Wood, and in approaching the Rohein Ledge keep

Guettes Point well open westward of Rohein Rock until the vessel is southward of that rock. In standing to the westward be careful not to approach too near the St. Quay Rocks: Pature Point kept open westward of Mener Bel Air Hills, at least double the apparent distance between their eastern and western peaks, leads a safe distance eastward of them, and when Cape Frehel Lighthouse is in line with the highest head of the Comtesses or when Etables and Plourhan Church steeples in line bear 288° a vessel is southward of their southeastern extreme.

At night, after rounding the Horaine, the Grand Lejon flashing white light is an excellent guide for entering St. Brieuc Bay. A vessel should pass about 2 miles westward of this lighthouse, and on entering its western red sector edge to the eastward to cross that sector and enter the southern flashing white sector of light; having done which she should steer about 187° between the St. Quay Rocks and the Rohein Ledge, keeping carefully within the flashing white sector of Grand Lejon Light. Having brought Port Binic fixed white light to bear 260°, she will be southward of all danger, and may, if desired, haul up for it and anchor in a depth of from 3 to 5 fathoms to await daylight. If proceeding to Port Dahouet, keep in the white sector of its light.

The general aspect of the coast from Pleneuf Point to Cape Frehel has been already given. A description of the numerous rocks and shoals by which this shore is fronted will now follow.

The Rohein and Comtesses Rocks are two rocky ledges, the first 5 miles and the second 3.5 miles in a west by north direction from Cape d'Erqui. Rohein Rock, at the southwestern extreme of the Rohein Ledge, is high above the level of the highest spring tides, and from its isolated position is easily recognized from some distance. This ledge is above 1 mile in diameter, many heads are uncovered at low water and others are awash, or nearly so. On its southern edge, eastward of Rohein Rock, the Basse Ronde uncovers 26 feet and the Basses du Sud-Est 24 feet. At its northern extreme is the Basse des Daouelins, a dangerous patch; from the least water on it, 3 feet, the extreme of Cape Frehel touches the southern side of Rohinet Rock 82°, and Pature Point is a little open westward of Rohein Rock 195°.

The Comtesses are ½ mile in extent east by south and west by north, and uncover at low water throughout. The two westernmost heads never cover. Between the Comtesses and the Rohein Ledges the Lae Rock uncovers 24 feet at the lowest tides.

Basse des Comtesses is a small ledge about 200 yards long, and its highest head, which uncovers 3 feet, lies ½ mile northward of the highest rock of the Comtesses; from it this latter rock is in line with the eastern face of Verdelet Rock bearing 165°.

Plateau des Jaunes, 1.5 miles northward of Pleneuf Point and 186° nearly 2 miles from the Comtesses, is nearly a mile in extent east and west, and the highest rocks on it, toward the northeastern end, never cover; the Bignons des Jaunes form the southwestern edge of the plateau. There is but little water between this ledge and Verdelet Rock, but coasters pass between by keeping the whitened summit of Rohinet Rock open the width of the turret northward of the red beacon turret of the Evette.

Guyomere and Ecarets Ledges.—The water is shallow for a mile offshore between Pleneuf Point and Cape d'Erqui, and several rocky ledges nearly bar all approach to it at low water. The highest of these are the Guyomere, the highest head of which uncovers 16 feet, and the Ecarets, which uncover 2 feet at the lowest tides. The latter rock bears 305° nearly a mile from Carouel Point, on which there is a stone windmill; from it Turquet Mill is in line with the southern extreme of the steep coast near Lahoussaye Point 82°, and the northern extreme of Bien Assis Wood is in line with a country house standing on the brow of a hill a little westward of a remarkable white spot in the steep declivity of the coast.

Trois Pierres—Buoy.—These rocks uncover 23 feet and extend 300 yards from the land in a southwesterly direction just southward of Cape d'Erqui, and form the northern boundary of the Rade d'Erqui. A black conical buoy is moored northwestward of the Trois Pierres.

Plateau des Portes d'Erqui — Beacon turret. — This ledge, about 1.5 miles westward of Cape d'Erqui, has on it four rocky heads which uncover from 26 to 29 feet, and the greater part of the reef is awash at high-water neaps. The highest head is the Evette, near the eastern end, on which is a red beacon turret; 200 yards eastward of this is the Izard Rock, at the edge of the ledge, which uncovers about 6 feet.

Pierres du Banc are two rocky patches 3.3 miles 88° from Petit Lejon. There is never less than 2¾ fathoms water on them, but they are dangerous in bad weather, as there is a heavy sea over the rocks on a weather tide. They lie close together, with the eastern side of Verdelet Rock in line with Tournemine Mill 188°, and the summit of the Grand Pourier Rock, between Rohinet Rock and the chapel on St. Michel Islet 120°.

The Landas are two rocks rising from the southern part of a ledge, 800 yards in extent east and west, on which there is a depth of only from 5 to 8 feet at the lowest tides. The eastern rock is then awash and the western rock uncovers 2 feet. These rocks lie midway between the Pierres du Banc and the Grand Pourier; from them Cape Frehel Lighthouse is seen between Amas du Cap and Bonnetot Rock (which latter lies 1,500 yards eastward of the Landas and uncovers 20 feet) 91°; and the chapel and mill of Pleherel are between Rohinet and the Grand Pourier 109°.

Buoy.—A black spindle buoy is moored northwestward of the Plateau des Landas.

Grand Pourier, Rohinet, and Justieres are the highest ledges of a rocky plateau, of which the southwestern extreme bears 355° ½ mile from Cape d'Erqui. It extends more than 2.5 miles in a northeasterly direction and is 1.3 miles broad at its widest part. Rohinet Rock never covers; the eastern summit of the Grand Pourier only covers at the highest tides and the Justieres uncover 28 feet. Except between the Justieres and Rohinet, nearly the whole plateau uncovers at low-water springs.

Buoys.—Two red buoys mark the southeastern side of this plateau; one is moored off its southern extreme ½ mile from Cape d'Erqui, the other on the southeastern edge of the Justieres.

The Bignons are ½ mile eastward from the Justieres and uncover 9 feet. Several rocky patches of from 9 to 18 feet lie near them.

Grande and Petite Liviere are two rocky patches northwestward of Cape Frehel. The Grande Liviere, covered with 14 feet water, lies 288° 3 miles from the cape, with the lighthouse nearly touching the southern extreme of Amas du Cap. A vessel will pass northward of this patch by keeping the summit of Amas du Cap in line with the lighthouse. At night the light should not bear more easterly than 130°. Pleneuf Point, on with the low extreme of Cape d'Erqui, leads ½ mile northward, and the spire of Plurien Church, in line with the summit of Renard Rock 192° leads about 400 yards eastward.

The Petite Liviere, with only 9 feet, bears 186° 1,600 yards from the Grande Liviere. When on this patch, Cape Frehel Lighthouse bears 96° distant nearly 3 miles, and Garenne Mill, the westernmost of two mills near the coast, is in line with the northwestern extreme of St. Michel Islet 215°. The spire of Plurien Church, in line with Renard Rock, which leads clear of the Grande Liviere, almost clears the eastern side of Petite Liviere.

Amas du Cap, a large and remarkable rock 271° 800 yards from the western extreme of Cape Frehel, never covers; when approached from the northwest it is not easily distinguished from the granite cliffs behind it, but from the eastward or westward, when clear of the land, it may be seen from a long distance and resembles a wedge with the high end to the northward.

Westward of Amas du Cap, between it and St. Michel Islet, are several rocky clusters 1,400 or 1,600 yards offshore; the principal are, the Plate St. Michel, on which stands a red beacon with conical top mark, the Mouillee which uncovers 13 feet, the Malicorne which dries 25 feet, the Truie, nearly awash, and the Jars which uncovers 13 feet at the lowest tides.

Erqui Bay is a small beaching place on the southern shore of the peninsula terminated by Cape d'Erqui, opposite the village of Erqui which is in the southeastern corner of the bay. Vessels ground on a bottom which dries about 16 feet above the lowest tides, and are sheltered from 321°, round by east, to South. The southern side of the bay is formed by the lofty point of Lahoussaye, which is prolonged seaward by an islet and some rocks.

A jetty in the northern angle of the bay, 300 yards westward of the little hamlet of La Chaussee, affords shelter against westerly winds to vessels capable of taking the ground, and there is a good place for grounding alongside its outer end on a bottom of sand and mud; the jetty should be left to port on entering. There are four buoys for warping, one of which, painted white, is outside the pierhead.

Light.—From a white cylindrical tower on the pier end at d'Erqui Harbor, a fixed white light with red, green, and obscured sectors is exhibited at an elevation of 29 feet above high water. In the white, red, and green sectors, the light is visible 6, 3, and 3 miles respectively.

Rade d'Erqui, close southward of Cape d'Erqui and fronting Erqui Bay, is the only anchorage on the eastern shore of St. Brieuc Bay affording tolerable shelter from easterly winds. The holding ground, in a depth of 5 or 6 fathoms water, is good, but it is prudent to leave the anchorage, especially in the winter season, if the weather is threatening and the wind likely to veer to the westward.

Semaphore.—There is a semaphore station on the summit of cape d'Erqui.

Tides.—It is high water, full and change, in d'Erqui road at 5h. 59m.; equinoctial springs rise 43 feet, ordinary springs 33¼ feet, and ordinary neaps 24½ feet above the soundings.

Chenal d'Erqui is the passage between the belt of rocks bordering the coast from Cape d'Erqui to St. Michel Islet, on the one hand, and the Grand Pourier, Rohinet, and Justieres ledges on the other. The depth is not less than 1¾ fathoms in the fairway of this channel at low water, springs, when it can be navigated only by small coasters; with a free wind, vessels of deep draft may pass through from half flood to half ebb.

Anchorage.—If windbound with strong northerly gales, some shelter may be found during neaps by anchoring southward of the Plate St. Michel Rock, with Rohinet Rock nearly touching the eastern side of St. Michel Islet. The depths here are from 19 to 22 feet, with good holding ground of muddy sand.

Bouche d'Erqui.—This inlet, nearly 3 miles eastward of Cape d'Erqui, is about a mile in extent; it dries at low water and its shore is formed of white sandy downs. About ½ mile northward of Champ du Port Point, the western point of the inlet, is the islet of St. Michel before alluded to, which is joined to the coast at low water and on which stands a chapel, very useful as a seamark. This is the only place on this part of the coast where, in bad weather and when compelled to do so, a vessel can run ashore with the hope of saving her crew. The vessel might even be saved if she were beached southward of Champ du Port point about an hour after high water; this point is marked by a red beacon, surmounted with a conical topmark.

Renard Rock—Buoy.—Off the eastern side of Bouche d'Erqui Bay and near the shore is this rock, which never covers, and is a useful mark; it stands out in dark outline against Bouche d'Erqui white sandy beach, and has a black buoy moored on its northern side.

Life-saving station.—A life-saving station, provided with rocket apparatus, is established at Pleherel, a fishing village about 2 miles eastward of Bouche d'Erqui and 3 miles westward of Cape Frehel.

Directions.—Vessels bound eastward and surprised by easterly winds when in the neighborhood of the Lejons, may bear up for shelter and run for the Rade d'Erqui by the Landas Channel, by that between Rohein Ledge and Petit Lejon, or between Rohein Ledge and the Jaunes to leeward of all the outer shoals, as wind and tide may best serve.

Through the Landas Channel.—If far enough to windward, this channel between the Petit Lejon and Pierres du Banc is practicable for vessels of the deepest draft after half flood. Three sand banks, dangerous only from the heavy sea they occasion when it blows hard on a weather tide, lie in this channel; from the largest, on which there is a depth of 4½ fathoms, Tournemine Mill is in line with Verdelet Rock 188°.

Run through this channel with Tournemine Mill in line with the highest summit of the Comtesses 178° until Turquet Mill comes on with Trois Pierres Point, ½ mile southward of Cape d'Erqui, 133° Follow this latter mark until within about ½ mile of Cape d'Erqui, when steer for Erqui Road. A vessel will keep eastward of Petit Lejon by having Verdelet Rock open eastward of the summit of the Comtesses; she will also pass northeastward of the Basse des Comtesses, and of the Comtesses, by keeping Turquet Mill in sight eastward of Lahoussaye Point, which mark will also insure her not being too close to the eastern part of the Portes d'Erqui, marked by a red beacon turret. The dangers on the eastern side of the channel may be avoided by not standing eastward of the line of Turquet Mill just touching the high land of Cape d'Erqui.

The channel between Rohein Ledge and Petit Lejon may be taken when seeking shelter in d'Erqui Road, either on the flood or ebb. The summit of the Comtesses in line with the southern extreme of Bien Assis Wood 143° leads ½ mile westward of the Grand Lejon and 400 yards westward of the Petit Lejon, close to the black bell buoy marking the latter. Steer with this mark on until past the Petit Lejon, when Turquet mill will be in line with Lahoussaye Point. Haul up for it, opening the mill a little eastward of the point to avoid the Comtesses, etc., and this will lead into the road as before.

In following this route before half flood great care must be taken to avoid the Daouelins and Comtesses patches and the Izard Rock, Portes d'Erqui, on the southern side of the channel, as well as the Petit Lejon on the northern side: also at low water and in bad weather a 3½-fathom patch 141° 1,500 yards from Petit Lejon.

The channel between Rohein Ledge and the Jaunes may be taken by a vessel too much to leeward for either of the other passages. It is sufficiently deep for vessels of moderate draft, even at low water. Having passed Rohein Rock, and if working up for the Rade d'Erqui, when standing northward, Cape Frehel Lighthouse open southward of the summit of the Comtesses clears the southern part of the Rohein Ledge, and the lighthouse in line with the large pointed rock at the foot of Cape d'Erqui clears the southern side of the Portes d'Erqui. In making the southern board Cape Frehel Lighthouse, open northward of Cape d'Erqui, leads northward of the Jaunes, and Turquet mill, well on with the steep coast which separates the beach of Erqui Bay from the beach of the large bay to the southward, keeps her northward of the Ecarets Rocks, which uncover 2 feet at the lowest tides. Pleneuf Point, bearing 220°, leads northward of the Guyomere and of the Ecarets and between the Portes d'Erqui and the cape.

Through Erqui Channel.—If surprised by strong easterly winds between Cape Frehel and St. Malo, a vessel may bear up for shelter in Erqui Road by passing through the Erqui Channel between half flood and half ebb. For this purpose, having rounded Cape Frehel, steer to the westward with the southern end of Amas du Cap Islet touching the extreme of the cape east. This mark leads well northward of the Jars, Truie, Malicorne, and Mouillee Rocks lying between the cape and St. Michel Islet, but scarcely clears all the rocks fronting the coast westward until abreast of the red buoy of the Justieres, when the steep point of Pleneuf will open out. Bring it on with the rock forming the extreme of Cape d'Erqui, bearing 222°; then, with this mark as a guide, steer to pass about 400 yards from this rock and round it into the road. The most dangerous part of this channel is when Cape d'Erqui bears between 186° and 170°. The vessel is then abreast the rocky patches of the southern part of the

Rohinet Plateau, which dry 5 feet at the lowest tides and are marked by a red buoy at their edge.

The Erqui Channel may also be run for by passing through the shoal patches between the Petite Liviere and the Bignons Rocks when there is sufficient water, and the depth is never less than 16 feet over any of them, nor does the sea break in the eddies caused by them. The leading mark through is the guardhouse at Pleneuf Point in line with the rock at the extreme of Cape d'Erqui 222°; when the extreme of Cape Frehel is on with the southern end of Amas du Cap, bearing east, proceed as before.

When running through the Erqui Channel for any of the ports on the western coast of St. Brieuc Bay, proceed as if bound for Erqui Road until the highest summit of the Comtesses Rocks is on with Rohein Rock 267°; then steer westward in this direction, passing 400 or 600 yards southward of the Comtesses, Lae, and Roehin Rocks. After passing the Comtesses, their highest point in line with Rohinet leads southward of Rohein Ledge and also of the St. Quay Rocks. Or Keep St. Michel Islet in sight and quite detached from Marre aux Rets Point, the eastern point of the little bay immediately eastward of Cape d'Erqui, which mark leads northward of the Portes d'Erqui; the extreme of Cape Frehel in line with the large pointed rock at the foot of Cape d'Erqui leads southward of this ledge and northward of the Jaunes.

Tidal streams.—The flood stream sets about east and the ebb west through the Erqui Channel; at springs both streams run at the rate of 4 knots. Round Cape Frehel it runs with great strength—at least 5 knots—and there are strong eddies occasioning a heavy breaking sea in bad weather. To avoid these, although the cape is steep-to, vessels should give it a berth of 1 or 2 miles at such a time.

Cape Frehel.—This promontory is the northern extreme of a high narrow neck of land a mile in length, 7.3 miles eastward of Cape d'Erqui, and nearly 12 miles westward of St. Malo. It is bordered on all sides by steep perpendicular cliffs about 150 feet high, and in clear weather may be seen from a distance of 15 or 18 miles. On the summit of some level land 550 yards 186° from its extreme is the lighthouse, an octagonal tower 72 feet high; about 40 yards eastward of the ruins are the old lighthouse. From this light tower Horaine Lighthouse bears 299° 27 miles; Grand Lejon Lighthouse 286° 14.3 miles; Corbiere Lighthouse, at the southwestern extreme of Jersey Island, 6° 29.8 miles; and Grand Jardin Lighthouse, at the entrance of St. Malo, 95° 9.5 miles.

Light.—From the lighthouse on Cape Frehel is exhibited, at an elevation of 259 feet above high water, a group-flashing white light. The light is visible 23 miles.

Semaphore.—There is a semaphore station on Cape Frehel halfway between the lighthouse and the extreme point.

Vessels from the westward prevented rounding Cape Frehel during easterly winds by the ebb stream, may await the turn of tide under the lee of the cape by making short tacks within the following limits: Amas du Cap seen between the extreme of the cape and the lighthouse; Amas du Cap between two and three times its apparent breadth northward of the cape, and Plurien Church spire between the Renard Rock and the eastern point of Bouche d'Erqui. This latter point is steep and high, while the Renaud Rock, as before observed, never covers, and stands out boldly against the white beach of Bouche d'Erqui.

CHAPTER IV.

CAPE FREHEL TO GRANVILLE.

The coast.—From Cape Frehel Lighthouse, Pointe du Roc, or Cape Lihou, on the southern side of which promontory is the port of Granville, bears 73° 29.3 miles, and the lighthouse on Pierre de Herpin, 82° 20 miles. The general direction of the coast line from point to point is southeasterly for nearly 7 miles from Cape Frehel to the Ile des Ehbiens; from thence it is easterly for 15 miles to Pointe de Grouin, the western point of the large but shallow Baie du Mont St. Michel; here the coast trends suddenly southward for about 6 miles, then eastward for about 15 miles, and, lastly, northward about 8 miles to Pointe de Champeaux, the eastern point of the bay, which bears from Pointe de Grouin 80° 11 miles, the coast line following the circuit of the bay being at least thrice that distance. From Pointe de Champeaux, Pointe du Roc bears 343° 5.8 miles.

About half way between Cape Frehel and Pointe de Grouin is the large and important port and town of St. Malo, at the entrance of the River Rance; between it and Cape Frehel are several small harbors and shallow bays penetrating about 3 miles within their entrance points, with anchorages fairly sheltered against westerly winds; but the whole of the coast between these two points is fronted by numerous dangerous rocks and ledges extending from 1 to 4 miles from the land. When 2 miles beyond or southeastward of Pointe de Grouin, which is surrounded by rocks and islets for that distance, and under the shelter of which the Rade de Cancale affords excellent anchorage during westerly winds, the character of the approach to the shore alters, the whole of the southern and eastern parts of the Baie du Mont St. Michel and as far northward as Granville being generally flat, shallow, and sandy.

Between Cape Frehel and Point de Grouin the general aspect of the shore is rocky, rugged, and moderately high; but within the bay of St. Michel, from Chateau Richeux Point eastward, it is very low, flat, and marshy. It again rises in the vicinity of Pointe de Champeaux, a bluff and nearly perpendicular headland, and from thence to Granville is of moderate height, the flat sands extending off it in this neighborhood being interspersed by low, flat, rocky ledges.

St. Malo and Granville approaches—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave any of the ports between Cape Frehel and Granville are earnestly requested to make use of the fairway defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the east and south by the coast between Cape Frehel and Granville; on the north by the Plateau des Minquiers and Iles Chausey; on the west by the meridian of Cape Frehel. The above limits have not been placed on the chart plates.

Anse de Sevignes, a small bay open to the 29° between Cape Frehel and Latte Point, has many dangers within it, and should not be run for as a place of shelter in heavy weather from the 209° on account of the great overfalls in it caused by the steepness of the coast and the violent squalls off the land to which it is subject.

Banc de l'Etendree lies off the northern part of Sevignes Bay; from the Etendree Rock at its western end, which uncovers 14½ feet, it extends about 1,600 yards in a 108° direction, and is 500 yards wide; some parts are nearly awash at the lowest tides.

Basse de la Latte and Basse Raimonde.—These rocks, lying southward of the Banc de l'Etendree, render the approach to Sevignes Bay or to within a mile of this rugged and precipitous coast, very dangerous, though the fishermen congregate here occasionally in great numbers. The Latte bears 12° 700 yards from the fort on Latte Point, and uncovers a foot at the lowest tides; the Raimonde bears 319° 800 yards from the fort and uncovers 9 feet.

Frehel Lighthouse, in line with Pointe de la Teignouse, the first point southward of Cape Frehel, leads between the Basse de la Latte and Latte Point; St. Jacut Mill, well open of St. Cast Point, leads outside all the dangers off the Anse de Sevignes.

Baie de la Frenay, between Latte and St. Cast Points, affords good shelter with offshore winds, but is quite exposed to those from the northeastward. The entrance is 2 miles wide, and from thence the bay trends 3.5 miles in a 220° direction to its head, but more than 2 miles of that expanse dries at low water.

The surrounding land is high and its northern shore free from danger. The holding ground is good and the best anchorage is in a depth of from 4½ to 5 fathoms, about ½ mile off Cierge Point, just southward of Latte Point, with Cape Frehel Lighthouse seen between Cierge Point and Latte Fort. The only precaution to be used in taking up a berth is to make due allowance for the fall of tide..

There are two mooring buoys in Frenay Bay, about ½ mile 175° of Latte Fort. A black beacon marks the rocks, which project from Moulin Point. The rock lying ¾ mile 35° from Pleboul Church never covers, and is whitewashed.

At high water vessels under 9½ feet draft can cross the high bank, which dries out from the head of the bay, and reach the beaching places of Port-Nieux and Port-a-la-Duc. Both are on the western shore, the first behind, and the latter about a mile southwestward of Muret Point.

Light.—On Muret Point, Port-Nieux, from a mast on masonry turret 13 feet high, and elevated 24 feet above high water, is exhibited a fixed white light, visible 4 miles.

Bourdinots Rocks—Buoy.—These are two small rocky ridges, one 1,200 yards, the other 1.1 miles, 68°, from St. Cast Point. The easternmost ridge, on which there is a depth of 5 fathoms, is dangerous at low water or when blowing hard; and the westernmost ridge, on which the highest rock dries 7 feet, must always be carefully avoided. A red spindle buoy with top mark is moored 200 yards northeastward of the shoaler ridge. The marks for the above-mentioned rock are a white wall on with the summit of the Bec-Rond Rock about 234°; and St. Jacut highest windmill open eastward of the summit of Colombiere Islet, which islet is ½ mile westward of the Ehbiens, 153°.

Grande Conchee Rock well open northward of Cezembre Isle 77°, or Tertre Morgan Windmill in sight northward of St. Cast Peninsula 248°, leads northward of both ridges.

St. Cast Point, 4 miles 133° from Cape Frehel, is high and nearly perpendicular on all sides. The approach to it is rendered dangerous at low water by the Bourdinots, also by low-water rocks which extend 600 yards from the foot of the point, and by Chelin Sandbank with only 10 feet water lying 355°, 900 yards, from the point. Teignouse Point in line with Latte Point leads outside Chelin Bank and between St. Cast Point and the Bourdinots Ridges.

Beacons.—A turret beacon, painted red, marks Cannevez Rock, which lies 500 yards 96° from the semaphore, and uncovers 42 feet at lowest tides. The beacon at the end of St. Cast Jetty is painted red.

Bec-Rond Rock, always uncovered, has its top whitewashed.

Semaphore.—A semaphore station is established on the summit of St. Cast Point.

Anse de St. Cast.—Southward of St. Cast, in front of the village of Lille St. Cast, the coast forms a small bay which affords good shelter from westerly winds to vessels capable of taking the ground. The head of the bay, for 150 yards offshore, is of muddy sand, on which spring tides rise from 24 to 30 feet and neaps about 15 feet. In steering for the beaching place, keep the village bearing about west, and do not approach the Bec-Rond Rock (the top of which is whitened) within 200 yards.

Arguenon Bay.—From St. Cast Point, at low water, dry sands connect the shore with the Ile des Ehbiens and with the opposite coast in the vicinity of St. Briac Harbor, the two deep bays of Arguenon and Lancieux, separated by a narrow promontory ending in Point Roche, being then dry throughout. The Arguenon River flows into the head of the Bay of Arguenon and is navigable up to Plancoet, at springs, for vessels of about 9 feet draft. Vessels capable of taking the ground will find shelter from easterly winds on the eastern shore of this bay abreast of an old convent, with St. Jacut Windmill bearing 119°, and Ehbiens Islet shut in by Chevet Point. Here the tides rise from 19 to 26 feet at springs and 9½ feet at neaps. There is also an indifferent grounding place for small coasters abreast of St. Jacut village in Lancieux Bay.

Light.—A fisherman's light is shown from the mole head of St. Jacut, Lancieux Bay.

Ile des Ehbiens, about a mile in circumference, is off Point Roche, just described, at the head of the bight between Cape Frehel and St. Malo. It is surrounded by high rocks, and near its center is a large and conspicuous tower which may be recognized from a great distance. It is joined to the shore at low water by the bank of sand which borders the coast from St. Cast Point to the entrance of St. Briac.

Close southward of Ehbiens is a well-sheltered grounding place, much frequented by coasting vessels formerly but not much used since the channels into St. Malo have been well lighted and marked. It is formed by a natural causeway of shingle, always uncovered and uniting the southwestern extreme of the island with some high rocks 400 yards to the southwest. The bottom is muddy sand and seaweed, and dries 7 or 8 feet above the lowest tides, which rise from 28 to 35 feet above it at springs and 18 or 19 feet at neaps. The best place for grounding, sheltered from all winds, is about 100 yards from the southern end of the island, with Agot Island entirely shut in by the southeastern extreme of Ehbiens.

Beacons.—There is also anchorage in from 2 to 5 fathoms in the bay between the Iles des Ehbiens and Agot, but it is open to northerly winds, and in the center of the bay is the Platus Rock, marked by a beacon turret painted with red and black bands. On the eastern and southern sides of the bay are several rocks, of which the Mouliere, marked by a black and white horizontally striped beacon, dries 31 feet, the Rochefort dries 39 feet, and the Gautrat, marked by a red and black beacon, dries 17 feet.

Directions.—When running for the grounding place at the southern end of Ehbiens, as soon as the island is made out, steer to pass about 300 yards eastward of the Haches, a ridge of rocks, of which some are always uncovered, extending half a mile in a northeasterly direction from its northern point. When Ehbiens Tower bears 299° haul close round the southeastern point of the island and anchor or, if necessary, run the vessel on the beach. If obliged to beat in. be careful to avoid the Platus and other rocks just described, as well as a half-tide rock 200 yards eastward of the high rocks at the southern end of the causeway.

St. Briac.—This little tidal harbor has little or no trade, is difficult of access, and should never be attempted without a pilot. It is at the entrance of a narrow valley, 1.5 miles eastward of Ehbiens, and about 1,600 yards southward of the high projecting point of Haye. The entrance, 400 yards wide. is between the Perronais Black Beacon marking the westernmost rock of the ledge extending southwestward from the southern end of Perron Isle, about 200 yards distant from it, and which dries 12 feet, and a red beacon on the extreme of a rocky ridge projecting northward from the peninsula of Lancieux; this latter rock dries 15 feet at the lowest tides, and in entering the harbor a vessel should steer to pass between these two beacons. Approaching the harbor from the northwestward, the leading mark up to the entrance is Marche Mill (the mill has been whitened and classed as a beacon), which stands southeastward of the village, just touching the mound of the calvary of St. Briac.

The channel narrows considerably ½ mile within the beacons at the entrance, and a vessel has then to pass between rocky heads, marked by beacons, the highest of which uncovers 19 feet, leaving red beacons on the starboard hand, black beacons on the port hand, and passing the Bouche Beacon, in the middle of the channel, on either side, after which she may anchor or ground as desired; three warping buoys are placed to assist vessels to their berths. The tides run with great strength in the channel, and the harbor is exposed to a heavy sea with strong northwesterly winds.

Depths.—Pilots berth vessels 321° of the town of St. Briac, with their heads toward the ebb stream, on a bottom of sand and mud, over which the tide rises from 20 to 26 feet at springs and from 12 to 13 feet at neaps. There is 6 feet more water at the entrance of the harbor than here.

In a little bight at the northern part of the harbor vessels may lie, out of the stream and sheltered from all winds, on a bottom of soft mud, but if of more than 13 or 14 feet draft they will be neaped for three or four days.

Offlying dangers.—The port of St. Malo is 4.5 miles eastward of the entrance to St. Briac. Before proceeding to a description of it and of its numerous entrance channels it may be well to describe the offlying dangers against which the mariner has to guard in approaching this coast.

Basse Trouvee.—This dangerous isolated rock has only 13 feet over it and 14 or 15 fathoms closeto on all sides; it occasions great overfalls during springs, and the sea breaks heavily upon it in bad weather. From it, Cape Frehel Lighthouse bears 230° 11.8 miles; Chausey Lighthouse, 70° 11.3 miles; Grand Jardin Lighthouse, at the entrance of St. Malo, 178° 8.3 miles; and the nearest rocks of the Minquiers group are only 5 miles distant to the northward. The marks for it are Amas du Cap, touching the southern part of the village of Hopitaux d'Erqui 231°, and Grande Conchee Fort, in line with La Cite Fort, St. Malo, 167°. Amas du Cap, seen between the hill on which Hopitaux d'Erqui stands and Cape Frehel, leads northward of the rock; the same hill, seen between Amas du Cap and Cape Frehel, leads southward. These marks, however, are very distant and can only be useful in very clear weather.

Basse des Sauvages are two rocky heads 320° and 140° from each other and 400 yards apart. There is a depth of 6 fathoms on the northern head, of 4½ fathoms on the southern head, and from 12 to 14 fathoms around. From the southern head, which is dangerous to vessels of deep draft, Cape Frehel bears 227° distant 6 miles, and Grand Jardin Light, St. Malo, 136° 7 miles. The marks for it are Saudray Point, Baie de la Frenay, a little open eastward of Cierge Point 209°, and St. Malo Church steeple, seen between the two hillocks on Cezembre Island 132°.

The village of Hopitaux d'Erqui, seen between Amas du Cap and Cape Frehel, leads ½ mile southeastward of the Sauvages; the northeastern extreme of Cezembre, in line with St. Malo church steeple 136°, leads northeastward; and the church steeple, in line with the rock Muriers, at the southwestern extreme of Cezembre, leads southward.

The Catis.—This rocky head, with 4½ fathoms water and about 14 fathoms around, lies with Cape Frehel Lighthouse bearing 243° 3 miles, the summit of Cezembre Island 105° 7.3 miles, and the steeple of St. Malo church 112° 9.5 miles. The marks for the Catis are the summit of Cape d'Erqui seen between Cape Frehel and Amas du Cap, and the tower of Latte fort in line with the hillock on Cierge Point 212°. By shutting in Cape d'Erqui with Cape Frehel a vessel passes southward of it, and by opening Cape d'Erqui 6° northward of Amas du Cap, she passes northward.

Caution.—In fine weather the two rocks last described can be dangerous only at low water and to very deep ships, but in bad weather they should be carefully avoided by all vessels in consequence of the heavy breaking sea they cause, especially on a weather tide.

Vieux Banc—Bell buoy.—Vieux Banc is a rocky ledge nearly 4 miles northwestward of Cezembre Isle, which generally betrays itself by a rippling. It is about 800 yards long, 96° and 276° 400 yards wide, and has several heads with but little water on them. A black and red bell buoy is moored a short distance westward of the highest head, which uncovers 5 feet at the lowest tides at the western extreme of the ridge. The marks for this head are Cape Frehel Lighthouse 261° distant 6 miles; Grand Jardin light 118° 3.8 miles; Varde Point just open northward of the Haies de la Conchee 96°; the highest of the Pierres des Portes in line with the southwestern bastion of the fortifications at St. Malo; and Chesne Beacon on with the southern slope of St. Cast Point 223°. The marks for the bank are St. Hydeuc church midway between the Petite Conchee and Cezembre 108°, and St. Guildo windmill just open westward of Colombiere Islet 202°.

At ½ mile northeastward of the Vieux Banc is a small patch with only 14 feet water and deep water all round. Sablons and Ballue lights in line lead very close past the northeastern side of this patch.

Clearing marks.—Parame church in sight northward of Petite Conchee 116° or the Herpin Rock twice its own breadth open northward of the Rochefort Rock black and red beacon turret, 88°, leads northward of the Vieux Banc; Parame church in sight southward of Cezembre Island leads southward; St. Guildo mill in line with the western part of Ehbiens Islet 206° leads eastward, and St. Jacut mill on with the eastern part of Ehbiens 184° leads westward. The summit of Varde Point in line with Grande Conchee Fort 89° leads between the Vieux Banc and the Banchenou.

The Banchenou, a small, rocky, 15-foot ridge 3 miles 358° from Ehbiens Tower and 1.8 miles 212° from the Vieux Banc, is dangerous to vessels of deep draft at low water, but at 2 hours' flood, at springs, there is a depth of from 25 to 28 feet over its highest head, which breaks occasionally at low water. The marks for the 15-foot head are the Haies de la Conchee midway between Grande Conchee Fort and the high part of Meinga Point 82°, and St. Jacut mill in line with Ehbiens Tower 178°; from it Cape Frehel Lighthouse bears 276° distant 5 miles, and Grand Jardin Lighthouse 92° 4.3 miles.

This little ledge lies directly in the fairway of vessels entering the River Rance by the Decolle Passage, but in addition to marks already given St. Malo church steeple in line with the summit of the Cheminees, high rocks which do not cover, seen midway between Decolle Point and Cezembre Island 104°, leads well northward of it; the church steeple on with Harbor Islet Fort 96° leads ½ mile southward, and it may be avoided eastward or westward by opening St. Jacut mill east or west of the Ile des Ehbiens.

Ile de Cezembre.—This is the largest of the group of rocky islets which lie off the entrance to the River Rance. It lies 2.5 miles 313° from the center of the town of St. Malo, is nearly 800 yards long 50° and 230° and 200 yards wide, and rises to a height of about 118 feet above high water. At each end is a hillock crowned by a battery. Its northern side is steep, rocky, and unapproachable, but its southern side has a gentle slope, and a little creek with a sandy beach protected by a small mole affords convenient landing.

The other rocks and islands of the group are described, so far as is necessary, in connection with the various channels leading through them to the Rade de St. Malo.

Directions.—When steering eastward along the coast between Cape Frehel and Grouin Point at or after half ebb bear in mind that so long as the Herpin Rock (which a stranger must remember is not the rock on which the Herpin Light stands, but is situated about ¾ mile southwest of it) is twice its breadth open northward of the Rochefort black and red beacon turret. The vessel will pass northward of the Vieux Banc and of all dangers between it and the Rochefort; also that in coming from the eastward, with Cape Frehel Lighthouse open northward of the Rochefort, there is nothing to fear from the Tintiaux or from any of the shoals in the immediate vicinity of Grouin Point. This latter is, however, a very distant mark.

St. Malo.—The town of St. Malo stands at the mouth of the River Rance, on the eastern side, on what was formerly a small rocky island, since connected with the mainland by the Sillon, a narrow causeway ¾ mile in length. In the construction of the modern inner harbor this causeway has been greatly widened and strengthened and now forms the northern side of the Bassin de St. Malo, with extensive quays and railway accommodations. The whole area of the former island is occupied by houses, and the walls are flanked by towers washed by the sea.

The manufactures are hosiery, cordage, soap, fishing nets, etc., but they are not extensive. There is also a tobacco factory. Shipbuilding is carried on, and besides building slips there are two gridirons for repairs, but no facilities for extensive works being done to iron hulls or machinery. Vessels are fitted out for the foreign and coasting trades, the former being chiefly with England and the northern countries of Europe and for the whale and mackerel fisheries.

The imports consist chiefly of coal, iron, pitch, etc., the exports of barley, butter, potatoes, fruit, wine, provisions, etc. Regular steam communication is maintained with the Channel Islands, and from thence with England, by the steamers of the London & South Western Railway; and there is also regular communication with Cardiff, Hull, St. Brieuc, Granville, and Havre by lines of steamers. Ferries ply between Dinard, on the opposite shore of the Rance, with St. Malo and St. Servan.

The population of St. Malo is about 11,986, exclusive of the military, and that of the adjoining town of St. Servan 12,335. St. Servan stands on higher ground, and may be considered a suburb of St. Malo.

St. Malo Port, protected by the town and Mole des Noires, is much frequented, and, with St. Servan, has more than 3,000 yards of quay frontage; it is difficult of approach, the flood rushing into the river entrance with great strength, and equinoctial tides rising to the height of 45 feet above the level of the lowest tides. It is also inconvenient of access to vessels of deep draft during the winter months, owing to the fact of high water, full and change, occurring at 6h. 5m., i. e., before daylight in the morning and after dark in the evening.

The harbor of St. Malo contains no dry dock, though two were originally projected; it consists of the Avant-port sheltered by the Mole, and the Bassin-a-Flot, from which the Bassins of St. Malo and St. Servan are entered. The Bassin-a-Flot is entered from the Avant-port by a passage 320 feet wide between the Bourse Quay of St. Malo and the end of the wall and embankment projecting from the northern point of St. Servan; there is in it a careening pontoon for vessels not exceeding 300 tons, two gridirons for the same class, and many warping buoys. On its eastern side is an interior reservoir, 66 acres in area, used for flushing purposes and for laying up dismantled shipping. A stone sill, used as a footpath when uncovered, crosses the entrance to the Bassin-a-Flot, and regulates the depth of water retained in this Bassin; it is raised 11 feet above the level of the lowest tides.

St. Servan and Dinard.—Masters of vessels are cautioned to make themselves acquainted with the general regulations in connection with the roadstead, the port, and the river that are set forth for their guidance. There are also a number of rules of procedure, relating to the use of and haulage in the locks of St. Malo—St. Servan.

Depths.—The anchorages in St. Malo and Dinard Roads are accessible by the Grand Chenal at all times of tide to vessels of the deepest draft. The Avant-port dries from 6 to 9 feet at the lowest tides, and has from 31 to 34 feet water at ordinary springs, and 10 feet less at neaps. The Bassin-a-Flot has 29½ feet over the sill at high water, springs, and 19 feet at neaps; the general depth within the Bassin-a-Flot, after the water has fallen to the level of the sill, is from 12 to 16 feet.

The Bassin of St. Malo has an area of 38 acres, a length of 1,143 yards, and a width of 152 yards; that of St. Servan an area of 33 acres, a length of 826 yards, and a width of 207 yards. The lock entrances are in each case 305 feet long between the gates. Vessels of 13 feet draft can enter the basins at neap tides, and of 23 feet draft at ordinary springs; but, from the shape of the basins, there is not moorage accommodation for vessels over 295 feet in length and 22 feet draft. Vessels can enter or leave the basins from 1½ hours before to 1½ hours after high water in the day time, but they are not opened at night except by special request, and an additional charge is made.

St. Malo Port—Depths.—When the lock gates are open there will be shown by day a white flag with a blue border on the flagstaff west of the harbor master's office; by night the entrance to St. Servan Lock is marked by a red light to port and a green light to starboard; when the bridge is open the red light is replaced by a white light. There are no lights at St. Malo Lock.

For particulars of basins, etc., see Appendix II.

The tide scale at Noires Mole, St. Malo Quay, and on St. Servan Jetty are graduated from a datum 13 feet above chart zero, but the depth over the sill of the Bassin-a-Flot is 2 feet in excess of that shown by the scales.

Coal is always obtainable, from 5,500 to 6,000 tons being usually in stock; vessels coal alongside the quays, where there is a depth of 18 feet. About 100,000 tons of coal is imported annually.

The Mole des Noires, a neat and substantial stone pier, built on the Noires Rocks at the southwestern angle of the town, in addition to its great convenience for landing passengers, protects the port from the heavy roll of the sea, to which it would be otherwise exposed with northwesterly winds. The pier is 1,290 feet long, about 16 feet wide, and at its head is a lighthouse.

A lifeboat is stationed at St. Malo.

Lights.—Five lights are established at and in the vicinity of St. Malo to assist the intricate navigation among the numerous dangers which mark the approaches to this port, viz:

1. **Grand Jardin.**—On the south extreme of Grand Jardin Islet is a circular lighthouse, 87 feet in height, from which is exhibited a fixed white and flashing red and green light. The light is elevated 65 feet above high water, is visible 14 miles in clear weather, and in conjunction with that on Rochebonne is a leading light.

2. **Rochebonne Light,** about ½ mile northward of St. Hydeuc Church, bears 89° 4.1 miles from Grand Jardin Light, and is about 2.3 miles eastward from St. Malo. It is shown from a square light tower, 52 feet in height and painted in alternate red and black bands; it is a sector fixed red light, elevated 128 feet above high water, and is visible 17 miles from seaward, but only from 7° on either side of its line of bearing from Grand Jardin Light.

3. **St. Malo.**—At the head of the Mole des Noires is a white circular lighthouse, from which, at an elevation of 33 feet above high water, is exhibited a group-flashing white light, visible 11 miles.

The entrance to the wet dock or basin of St. Malo is marked by two reflecting lights, red on the port hand, green on the starboard, as viewed from seaward.

The green light (starboard hand) is not, however, placed at the extreme angle of the dock; the small arm projecting about 50 yards beyond it is not lighted. Vessels entering at night, to avoid this projecting arm, should therefore keep fore and aft the center line of the dock.

The entrance to St. Servan Lock is marked by red and green lights, the red being altered to white when the lock is open.

4. **Bas Sablons.**—From a square white house, 47 feet in height, on the southern shore of this bay is exhibited at an elevation of 60 feet above high water a sector of fixed green light visible 16 miles, and in conjunction with Ballue Light gives the direction for the entrance of the harbor.

5. **Ballue.**—On Ballue Hill, 129° 1,804 yards from the Sablons Light, from a square tower, 103 feet in height, with a black top, is exhibited at an elevation of 221 feet above high water a sector of fixed green light visible 17 miles through an arc of 7° on either side of the line of bearing with Sablons Light. The leading lights increase in power as the leading line is approached.

Pilots.—The St. Malo pilots cruise in all weathers in two cutters. One is stationed near Cape Frehel, the other cruises off the port, between it and the Chausey Isles; in bad weather the latter frequently takes shelter under the lee of Cezembre Island.

There are 10 pilots belonging to St. Malo and 5 pilots at St. Cast; these latter can always pilot vessels to the roadsteads, but not into the basins unless no St. Malo pilot presents himself; they may generally be found off Ile de Brehat and near the Roches-Douvres. With westerly winds vessels from the westward requiring pilots should keep near Cape Frehel; with northeasterly winds, near the Minquiers Rocks.

It is the duty of all masters of vessels to facilitate the boarding of a pilot and to make signals at night by blue lights and flare-up lights; also, by day, to keep the pilot jack up until the Bassin is entered.

Every pilot has a silver anchor attached to a buttonhole of his waistcoat, and has a livret or pocketbook which he is bound to produce on demand.

Roadsteads.—There are two fair roadsteads at the mouth of the river Rance, where vessels of deep draft generally anchor to unload or to await tide to enter the port; they are the Rade de St. Malo and the anchorage of Dinard. The Rade de Solidor, off the bay of that name and abreast of St. Servan, is too shallow and confined to receive vessels of large size.

Rade de St. Malo is on the eastern side of the entrance to the Rance, 800 yards westward of the town of St. Malo; it occupies a space of about 400 yards long, north and south, is 200 yards wide, and has a depth of from 4½ to 5¼ fathoms throughout. It is bounded on the north by the Basse Broutard, on the east by the sandbank which fronts the town and dries at low water, and on the south by the Plateau de la Rance, the northern head of which bears 158° 540 yards from the Broutard. The Petite Rade is southward of the Plateau de la Rance.

Basse Broutard is a small rocky patch about 130 yards long, 96° and 276° and 60 yards wide, covered with only 8 feet water; from it the sentry box on Varde Point is seen between Grand and Petit Bey Islets, and St. Hydeuc Church steeple is a little open northward of the northern bastion of the ramparts of St. Malo, bearing 71°.

Plateau de la Rance—Buoys.—This rocky ledge, 470 yards in extent north and south and 200 yards wide, has on it six dangerous heads, two of which uncover, one 2 feet the other 3 feet, at the lowest tides, when there is a depth of about 1 foot only on three of the other heads and 15 feet on the sixth, which is at the northern part of the ledge. Two buoys, the northern one black and white, the other black, mark the north and southwest extremes of this danger.

Clearing marks.—The Bourse of St. Malo, on the quay southward of the town, just opening off the southwest bastion, leads northward of this ridge. The western head of Bizeux Rock, in line with the high rock at the foot of Bechard Point 158°, leads 65 yards eastward. The Merciere Beacon, in line with the eastern head of the Bizeux 144°, leads westward, and the Bourse on with the Noire Molehead leads southward of the shallow head near the southern end of the ridge.

The Bizeux is a large, high rock, lying east and west, to the southward of the Banc de Solidor. Two deep clefts divide its summit into three conspicuous heads. Eastward of this rock is the Petit Bizeux, marked by a red beacon.

Anchorage.—The holding ground in St. Malo Road is fairly good and vessels moor nearly north and south in the direction of the tidal streams. The best position is in the middle of the road, with the eastern head of the Bizeux in line with the high rock at the foot of Bechard Point, and the mound on Garde Guerin Point a little open southward of the summit of the Grand Vide, bearing 262°. Vessels of light draft anchor a little eastward of this.

The road is well sheltered from all winds between west and northeast round by south and east, but northerly and northwesterly winds, when they blow with any strength, send in a heavy sea during the time the ledges outside the river are covered, i. e., from 2h. before to 2h. after high water at springs. The flood stream in the road never exceeds 3 knots, and the ebb, which Bechard Point turns toward the opposite shore, never runs with sufficient strength to prevent communication with the port.

There is fair holding ground in from 18 to 22 feet in the Petite Rade de St. Malo, a short distance southeastward of the Plateau de la Racè; southward of the plateau, to the distance of 200 yards from the southern rocky head, depths of 2¼ and 2½ fathoms will be found. When at anchor in the center of this road the extreme of Bechard Point is in line with the middle of the Bizeux, and the outer angle of St. Louis Bastion is open about 6° southward of the molehead.

Anse de Dinard.—This bay is abreast of St. Servan on the western side of the Rance between Points Dinard and Vicomte; grounding places extend along its western shore from the old shipyard below the village to the new one beneath the mill on Dinard Point. The bottom here dries from 12 to 15 feet, with a very gradual slope toward the edge of the bank; springs rise above it from 18 to 24 feet, neaps 9 or 10 feet; it is composed of stiff mud covered with seaweed, and when it blows hard from the northeastward vessels strike heavily in grounding, and as the anchors of small vessels bite with difficulty care should be taken to bury them in the mud at low water; avoid also grounding eastward of the line on which Grande Conchee Fort begins to open eastward of Dinard Point, as the bottom there is deeply furrowed.

Dinard anchorage.—Vessels of deep draft, unable to enter Port St. Malo during neaps, often await spring tides at this anchorage, where they are well sheltered from all but northerly winds. It is just outside the outer edge of the mud in Dinard Bay and is ½ mile in extent from the Petit Palais Rock to the Basse Schevre. La Pierre a Tison, a small rock 250 yards southwestward of Cezembre Island, open off Dinard Point, bearing 327°, leads along the outer limit of the mud flat in Dinard Bay until distant 400 yards from Point Vicomte.

The best anchorage, where the depths are from 4¼ to 5 fathoms, is limited northward by the line of the Solidor Tower seen between the extreme of Bechard Point and the little fort, and southward by the same tower open its own breadth northward of the high steeple of St. Servan Church.

This roadstead is the general rendezvous for vessels of war; it is preferable to that of St. Malo Road, being better sheltered against the prevailing winds, though the holding ground, except close to the edge of the mud, is not so good and the tides are stronger. Ships at this anchorage should always be ready to weigh or slip, as bad weather may at any time make it necessary to take shelter farther up the Rance.

Light.—A fixed white light is exhibited from Dinard Mole.

A fog bell, the regular working of which, however, is uncertain, is sounded near the light tower.

A lifeboat is stationed at Dinard.

Anse de Solidor, on the western side of the town of St. Servan, is 200 yards wide at the entrance, and its shores are almost entirely occupied by the military establishments of the town. Merchant vessels remaining some time in the bay are usually placed at the entrance, between the Quai des Corbieres and the rocks at the foot of Solidor Tower, where the bottom dries 12 or 13 feet, and springs rise from 25 to 32 feet above that level, neaps about 15 feet. A stone slip with a wooden platform at the end for the accommodation of passengers from Dinard extends from near the Solidor Tower to the edge of the sands which dry; this is very dangerous to vessels entering Solidor Bay. When the Petit Bizeux Rock, marked by a red beacon, is awash there is a depth of 15 feet water over the platform at the end of the slip.

A small grounding place, called St. Pere Port, in the northern part of the bay at the foot of the peninsula of La Cite, northward of the Solidor Tower, is about 84 yards wide, 270 yards deep, and will contain 14 or 15 vessels of the tonnage and draft of those employed in the Newfoundland trade. The grounding places toward the middle of this bay dry 10 feet. Vessels of about 13 feet draft can enter at high-water neaps.

Solidor Road is a small deep, parallel with the shore, 400 yards long north and south, and only about 80 yards wide between the beach which dries in front of Solidor Bay and the Solidor Bank, which also dries about 8 feet; the soundings are shallow and, the space being so limited, long-heeled vessels occasionally take the ground, the greatest depths at low water being 18 feet. The road is sheltered on all sides so long as the bank is uncovered, but when it blows hard from the westward and the bank is covered there is considerable swell. Two mooring buoys occupy the best positions in this road, and a black beacon on the north extreme of the Zorieux Rocks marks its southern extreme.

Banc de Solidor bounds Solidor Road to the westward, and uncovers 8 feet. Its northern extreme is 85 yards southward of Bechard Point; from thence it extends 600 yards 141° and terminates less than 100 yards northward of the Bizeux Rock. It is about 200 yards broad and is composed of fine white sand mixed with broken shells.

Riviere de La Rance.—The Rance is tidal as far as Dinan, 14 miles above St. Malo, and navigable at high water the whole distance; but the last anchorage at which vessels of moderate size can lie afloat at low water is at Jouvante, only 3 miles above St. Malo.

Tides and tidal streams.—It is high water, full and change, at Port St. Malo at 6h. 5m.; equinoctial springs rise 45 feet above the zero of soundings, which is the level of the lowest tide known; ordinary springs rise 40½ feet, ordinary neaps 30 feet. The water rises above the sill of the entrance to the Bassin-a-Flot 33½ feet at equinoctial springs, 29½ feet at ordinary springs, and 19 feet at ordinary neaps. The height of the tide above this sill is shown on three tide scales, one painted on the outer face of Noire molehead, another on the quai at St. Malo, near the entrance, and a third on the face of the jetty at St. Servan.

The streams run with great strength during springs at the entrance of the Grande and Petite Conchee Channels, the flood northeastward, the ebb southwestward. Their rate is about 4 knots at half tide across the Grand Chenal de la Rance until as far in as the Buron Beacon Turret.

Southward of the Buron Beacon Turret the flood curves and sets into the river with the same velocity. The ebb from the river divides, one part running out by the Grand Chenal, the other by the Decolle Passage. Both streams take the direction of the latter passage and run at about the same rate—3 to 4 knots.

Channels leading into the Rance.—All the channels leading into St. Malo are between Garde Guerin and Varde Points, through the midst of the numberless dangers by which the coast is so thickly studded. These channels lead between rocks, some always above water and many others which uncover between a quarter ebb and low water, and amongst sand banks and shoals, of which some are dry or nearly awash at low-water springs; several small islets, however, such as Cezembre, Grande Conchee, Harbor Isle, the Beys, and the higher rocks, serve as good marks by which these dangers may be avoided.

The main course of the Rance extends 3.5 miles northwestward beyond Dinard Point and St. Malo, through the Grand Chenal de la Rance, with its double opening through the Grande and Petite Porte Channels. Entering by the Grande or Petite Porte Channels, the depth is not less than from 4 to 5 fathoms at low water; this entrance is, therefore, navigable at all times by vessels of deep draft.

Besides this channel there are five others through which pilots take vessels with a proper rise of tide; they are the Decolle, close to the land southwestward of the Grande Porte; the Petite and Grande Conchee; the Petits Pointus; and the Bigne. The four last are all eastward of the Ile de Cezembre.

With easterly winds, pilots prefer entering the Rance by the Conchee in preference to the Grande or Petite Porte Channels, the eddies with these winds not being so violent in the Conchee as in the other channels.

Decolle Passage lies close alongshore westward of the entrance to the Rance, from Dinard Point to Decolle Point, on which latter is a semaphore. It can be navigated by vessels of moderate draft from half flood to half ebb; in case of need, those of deep draft may use it with a leading wind, at springs, from one hour before until one hour after high water. Pilots prefer this channel with an offshore wind, as the sea is then smooth; its limits are defined by beacons on rocks, nearly all of which cover at high-water springs, and its western entrance is between Decolle Point and the Mouilliere Rock, where its breadth does not exceed 200 yards.

Directions.—Vessels entering the Decolle Passage from the westward generally pass between Agot, a high and narrow islet about 1 mile westward of Garde Guerin Point, and Nerput, a high isolated rock which uncovers 40 feet 1,600 yards northward of that point and on which is a red beacon turret 13 feet above high water. This entrance has the advantage of being directly with the tide, but in stormy weather it can not always be taken, as breakers sometimes extend completely across the pass between Decolle Point and La Mouilliere.

Mole des Noires Lighthouse just open northward of the high rocks at the extreme of Decolle Point 96°, leads between the Nerput Rock and the Grande Brousse Bank, on which there is only 11 feet water (but at the time of tide when this passage is navigable the depth over it is at least 30 feet), and 300 yards northward of the Platier des Lardieres. Keep this mark on until the steeple of St. Hydeuc Church is in line with the summit of the Grand Buzard 82°, which leads in the deepest part through the western entrance of the passage, about 150 yards southward of the red beacon on the Mouilliere Rock; if the Grand Buzard is covered, keep Parame Church and St. Hydeuc Windmill in sight between Fort Royal and Harbor Isle, with the church the same distance northward of the fort as the mill appears southward of the isle.

Having passed these narrows, proceeding with La Latte Fort on with the Nerput 279°, or with the southern mill of Talard, white, twice its width open northward of the Mole des Noires Lighthouse and on with the end of the white mark on the Mole, the vessel may run eastward between the Petit Buzard and Petit Genillet Rocks and between the Mouille and Rochardien Rocks, all of which have beacons, and when near the latter the dome of St. Servan Church will be seen between the two chimneys of the house in Fort La Cite, which from thence is the leading mark until the marégraphe at Point Bechard is in line with a little clump of trees between Points Corbiere and Aiguille, or until the highest of the Cheminees Rocks is in line with the cleft in the Mouille Rock, either of which marks leads into the fairway of the river between the Pierres d'Amourette and the Roches Bonnes, and between the Pourceaux Rocks and Mi-Maree Rock off Dinard Point, all of which rocks are also marked by beacons.

If the tide is low, the dome of St. Servan Church will not be visible, but only the standard of the lightning conductor on its summit.

The Mouille Rock is at the western end of the Pourceaux Bank, and it uncovers 39 feet at the lowest tides; when it is more than 3 feet above water, a vessel must pass between Dinard Point and the Pourceaux Rocks by the directions just given, but when the Mouille is covered or is less than 3 feet out of water vessels of considerable draft may run across the bank between that rock and the Pierres d'Amourette Rocks, there being then at least 4 fathoms over it. To cross the bank steer 82° with the mound on Garde Guerin Point, seen over the land of Decolle Point, well open northward of the Grand Vide Rock, which never covers; this mark leads up to St. Malo Road, where vessels generally anchor until there is sufficient water to enter the port. This track is often followed by vessels leaving St. Malo on the ebb by the Decolle passage, the narrow and dangerous pass between the Pourceaux beacon turret and Dinard Point being thus avoided.

Vessels often pass northward of the Nerput Rock and enter the Decolle passage either by running between the beacons on the Mouilliere and Petit Pot-de-Beurre Rocks or by passing close eastward of the beacon on the latter. Either of these channels has the disadvantage of a beam tide, but the former has a good depth of water and is nearly 200 yards wide. To steer through it keep well northward of the Nerput, and bring the white marks of Roche Pelee and Pival in line bearing 133°; this leads through the center to the leading marks already given for the Decolle passage, leaving on the starboard hand at about 800 yards a 19-foot patch named Rat du Nord-Est, at nearly 200 yards the Basses des Marechaux and at 70 or 80 yards the outlying rocks of the Mouilliere. On the port hand it passes 120 yards from the Sauts-aux-Chiens, 100 yards from the Grande Basse, and close past some rocks awash at low water extending more than 100 yards southwestward from the black beacon with cylindrical topmark on the Petit Pot-de-Beurre.

To pass over the reefs and eastward of the Petit Pot-de-Beurre, steer 127° for the little patch of white sand just westward of Pelee

Point; this mark leads over the Sauts-aux-Chiens, a rocky patch on which there is a depth of 10 feet at low water and from 5 to 6 fathoms at half flood, and 100 yards eastward of the Petit Pot-de-Beurre beacon. When this beacon is passed, haul a little southward to enter the Decolle Passage and to avoid a small rock which uncovers 4 feet 200 yards southward of the Grand Pot-de-Beurre. As soon as the leading marks for the Decolle Passage come on, proceed as before directed.

From St. Malo Road to Solidor Road.—When southward of the Plateau de la Rance, the two principal dangers to be avoided between St. Malo and Solidor Roads are the Rat de la Merciere and the Merciere Ridge; the former is a small isolated rock, covered with only 4 feet water, in midchannel 302° 700 yards from Bechard Point: when the Pourceaux Rocks are covered there is a depth of 17 feet on this danger and 22 feet when the tide reaches the foot of the Pierres d'Amourette beacon. The Merciere Ridge is 100 yards westward of La Cite Peninsula. The highest head on this ridge uncovers 20 feet at the lowest tides, covers a quarter of an hour before half flood at springs, and is marked by a red and black beacon.

At neap tides vessels bound to Solidor Road may pass on either side of the Rat de la Merciere, but at springs they should keep as much as possible over toward the eastern bank of the river to avoid the strength of the tide and pass eastward of the Rat. For this purpose, when abreast of St. Malo, keep the eastern head of the Bizeux Rock and the Merciere beacon in one 144° until the Mole des Noires Lighthouse is in line with St. Malo Church, then steer to pass about 150 yards westward and southward of the Merciere beacon.

In case of necessity only a vessel may run between the Merciere beacon and La Cite Peninsula by keeping the Mole des Noires Lighthouse in line with the northwestern side of the Calfats Rock, but the tides run strongly in this passage, which is only 130 yards wide and has a depth of 13 feet at low water.

On account of the eddy during the flood occasioned by Bechard Point, the most favorable time for entering Solidor Road is at high water. Vessels entering before that time, when rounding Bechard Point and for a space of about 200 yards east and west, experience the flood stream setting with great velocity southwestward, and the eddy, not less strong, setting northwestward. The eddy begins to be felt near the shore about 2 hours before high water, and its breadth and strength increase as the tide rises.

To enter the road, Grand Larron Tower in line with that of Solidor leads between Bechard Point and the Solidor Bank; when within the latter, anchor as convenient: but to take up a safe berth the services of a pilot are necessary.

Grand Chenal de la Rance—Grande and Petite Porte Channels.—The Grande and Petite Porte Channels are the only passages into the Rance navigable at low water. They are westward of Cezembre Island, are divided from each other by the Pierres des Portes and other rocks, and unite between the Grand Jardin and the Pierres de la Savatte, at the entrance of the Grand Chenal de la Rance; they may be used by vessels of the deepest draft at all times; no large square-rigged vessels, however, should attempt either channel except with a leading wind of sufficient strength to enable her to keep the leading marks on and to stem the tide, bearing in mind that the course when within the narrows is about 130°.

The tidal streams in the vicinity of the chain of scattered rocks which divide these two channels are very strong during springs, attaining a velocity of 4 or 5 knots, and making them always dangerous at low water, as well as at other times, when the wind is fresh on a weather tide, by reason of the overfalls they occasion. A description of these rocks now follows:

Light and submarine bell buoy in approach.—A buoy, painted in red and black horizontal stripes, showing a fixed white light, and fitted with a submarine bell, is moored experimentally at a distance of about 2 miles 309° from Le Grande Jardin Lighthouse.

The Buharats Rocks, of which the highest head has only 6 feet water, is the westernmost of this rocky chain, its shoalest spot bears 274° 1.5 miles from Grand Jardin Lighthouse, with the Nerput Rock beacon turret in line with the summit of the mound on La Haye Point 209°, St. Malo Church steeple in line with Petit Bey Fort 111°, and Grande Conchee Fort midway between the northern point of Cezembre and Meinga Point 77°.

Bell buoy.—A black bell buoy is moored off the southern side of the Buharats, about 50 yards from the edge of the bank.

Pierres des Portes—Beacon turret.—The Pierres des Portes are three high rocks, of which the central one uncovers 37 feet, 285° 1,300 yards from Grand Jardin Lighthouse; a black beacon turret surmounted by a ball stands on the southwesternmost rock, which dries 25 feet at low water, springs, and scarcely covers at high water, neaps. Several shoal rocky patches extend about 400 yards in a westerly direction from the beacon turret; they are named the Couillons de la Porte, and 57° at 400 yards distance are the Basses Nord-Est des Portes, extending 200 yards farther in the same direction, with as little as 3 feet water on one small pinnacle; also the Basses a Louise and the Fontaines des Portes, with one shoal spot of only 3 feet at the western end of the latter.

Buoy.—A black conical buoy is moored on the southern side of the Pierres des Portes rocks, 200 yards 237° from the beacon turret.

The Bunel, Hupions, etc.—The Bunel, the northeastern rock of the chain, is the only one lying eastward of the Petite Porte Channel; it uncovers 12 feet, and bears 247° 1,200 yards from Grand Jardin Lighthouse. The Hupions on which there is a depth of 4½ fathoms, and the outer head of the Grande Hupee, with only 3 feet water, lie, the first 1,270 yards, the other 1,000 yards 4° from the beacon turret on the Pierres des Portes. The Grande Hupee is very dangerous; the marks for it are the highest head of the Pierres des Portes in line with the summit of Bellefard Point 181°; and the southern end of the fort on Varde Point touching the northern side of the Petite Conchee 91°; 212° 400 yards from the Grande Hupee is the Rat des Courtis, at a depth of 4½ fathoms; and, westward 200 yards from it, La Nouvelle Decouverte, a patch covered with as little as 11 feet.

Buoy.—A black and red conical buoy is moored off the northern side of the Bunel Rock.

The Grande Porte Channel extends 1.5 miles in a 91° direction from its commencement southward of the Buharats Rocks to its junction with the Grand Chenal de la Rance near the Grand Jardin Lighthouse, passing between the Pierres des Portes and Banquetiers Rocks, 130 yards northward of which latter is the Boujaron Rock, which uncovers 13 feet and is marked by a red beacon turret; and the Basse du Boujaron, awash at low water, 100 yards 35° from the beacon turret. The eastern part, at the entrance of the Grand Chenal de la Rance, is about 400 yards wide; its limits are marked by a black iron beacon surmounted by a ball on the outer rocks of the Grand Jardin, and by a red iron beacon with conical top mark on the eastern rocks of the Pierres de la Savatte.

Grand Jardin, Savatte, and Traversaine Rocks.—The Grand Jardin beacon marks the northern side of the channel; it stands on a rock which uncovers 19 feet, south 70 yards from Grand Jardin Lighthouse. The Savatte or Pierre a la Vache red beacon, on the southern side of the channel, is on the Pierre a la Vache, the easternmost rock of the Pierre de la Savatte; it uncovers 22 feet and is awash at about half flood; this beacon bears 184° 600 yards from the lighthouse. The Traversaine, a rocky bank 200 yards in extent northwest and southeast and 100 yards wide, lies in midchannel between the two beacons; it is steep-to and is dangerous at low water, having only 3 or 4 feet water over it at that time.

Buoys.—Besides the buoys already described marking the northern side of the channel off the Buharats and Pierres des Portes, are the following three buoys:

1. A red buoy moored about 100 yards northeastward of the Basse du Boujaron, from which the Pierres des Portes buoy bears about 333° 300 yards.

2. A red buoy northward of the Sou Rock at the northern extreme of the Pierres de la Savatte, 500 yards 310° from the Savatte Beacon, and 950 yards 102° from the first buoy.

3. A red buoy near the northeastern edge of the Traversaine, about 300 yards 153° from the Grand Jardin Beacon.

Grand Chenal de la Rance is 2.3 miles long from the Grand Jardin to St. Malo Road. It is bounded on the western side by the Pierres de la Savatte; by the Pierre Salee Flats, which have from 8 to 12 feet water over them; by the Buron, an isolated conical rock which uncovers 24 feet and has on it a red beacon turret surmounted by a ball; and by scattered rocky heads as far up as the Pourceaux Rocks. On the eastern side, it is bounded by the off-lying rocks of the Grand Jardin; by the Pierres Garnier, of which the highest head uncovers 5 feet; and by the rocky heads on the western slope of the Ouvras Ridge, of which the greater part uncover at low water.

The narrowest part of this channel is between the Basse du Buron, a small rocky head with only 3 feet, and the Buron Rock; they bear 54° and 234° from each other and are 270 yards apart. At 400 yards northeastward from the Basse du Buron is the Ouvras Beacon, on the highest head of that reef, which uncovers 17 feet.

Buoys.—The eastern side of the channel is marked by the following four black buoys:

1. The first or outer buoy is moored near the southwestern edge of the Pierres Garnier, 119° 700 yards from the Grand Jardin Beacon.

2. The second buoy is moored on the western edge of the Clefs d'Aval. the northernmost rocks of the Ouvras Ledge; it bears 127° ½ mile from the outer buoy.

3. The third buoy is just westward of the Basse du Buron, and, with the Buron Beacon turret opposite, marks the narrowest part of the channel; it bears 139° 800 yards from the second buoy.

4. The fourth buoy is near the southern edge of the Ouvras; it bears 133° 400 yards from the third buoy.

Directions — Grande Porte Channel. — The leading mark through this channel is Grand Jardin and Rochebonne Lighthouses, in line 89°. This direction leads 130 yards southward of the Buharats black bell buoy, close southward of a rocky head of 20 feet, a cable southward of the Pierres des Portes black buoy, 65 yards northward of the Basse du Boujaron red buoy, and only 50 or 60 yards northward of an 18-foot patch northeastward of the Basse du Boujaron buoy.

When nearing Grand Jardin Lighthouse alter course just before Anse des Sablons Lighthouse comes on with Ballue light tower and then proceed with these objects in line 129°. This course leads close past the edge of the 3-fathoms spur off the southwestern end of

Grand Jardin; about 90 yards eastward of the Traversaine Bank; close to the edge of Pierre Salee Flats; and from thence in mid-channel between the red beacon turret on the Buron Rock and the black buoys on the edge of the Ouvras to the Rade de St. Malo. By night the same directions apply by using the lights.

Or when within 400 yards of Grand Jardin Lighthouse bring the Seminaire or College of St. Servan open about half the apparent breadth of its front eastward of the eastern angle of La Cite Citadel 130°; this leads 100 yards northeastward of the Traversaine and of the Pierre Salee Flats and 150 yards eastward of the Buron Rock beacon turret.

At low water care is necessary to avoid the 18-foot spur extending 80 or 90 yards southwestward of the Grand Jardin Beacon, which may be done by keeping the leading-mark slightly open until the beacon opens northward of the mound, then keep the fairway mark again. A vessel is eastward of the Traversaine Bank when St. Lunaire Mill is its own length westward of the Haumet Rock.

The Grande Porte Channel may be entered between the Buharats and the Pierres des Portes, and, with a leading wind, this route is the best at low water; the leading mark is the steeple of St. Enogat Church, in line with the eastern side of Haumet Rock 144° until the northwestern windmill of Petite Parame is seen between the southeastern mill and the southeastern angle of Fort Royal, 113°; this leads southward of the Pierres des Portes black buoy and in mid-channel between the Pierres de la Savatte and the Traversaine Bank up to the leading mark for the Grand Chenal de la Rance. The face of the mill, as well as the southeastern angle of Fort Royal, are whitewashed, in order to be easily recognized at a distance. A good mark for passing between the Traversaine and the Pierres de la Savatte is the Buron red beacon turret on with Anse des Sablons Lighthouse 127°, but this line must be quitted when past the Traversaine Bank, as it leads over the Salee Flats.

Note.—Approaching the Grande Porte Channel from the southward and westward of Le Vieux Banc, the above experimental light and submarine bell buoy moored between this bank and Ile De Cezembre is not passed inside a distance of 1.3 miles; but approaching the Petite Porte Channel from the northward and eastward of Le Vieux Banc it is passed at a distance of about ½ mile on the starboard hand when hauling to the southward as directed below.

Petite Porte Channel.—If entering the Grand Chenal de la Rance by the Petite Porte Channel, Harbor Island Fort open westward of Grand Jardin Lighthouse 150°, or the lighthouse in line with the mill on Dinard Point, leads through the clearest passage up to Grand Jardin; but to reduce as much as possible the turn around the southern extreme of the Grand Jardin, it is usual to pass through the chain of reefs farther westward. For this purpose, when approaching the entrance, bring the western end of Cezembre Island on with the center of the town of St. Malo, and when within 2 miles of the island steer to the southward to bring Grand Jardin and Ballue Lighthouses in line 130°. This leads between the Grande Hupee and the Rat des Courtis and northward of the Basse Nord-Est des Portes. When within 400 yards of the lighthouse, steer to round the Grand Jardin and proceed as before directed.

Grand Jardin Lighthouse, in line with Jeannet Windmill (without sails) 181°, leads between the Bunel Rock and the shoals 400 yards westward of the western end of Cezembre; but in using this channel a vessel must edge away to the southwest to round the Grand Jardin as soon as either Paramee or St. Hydeuc Church steeples open of the southwestern point of Cezembre.

The Petite Conchee Channel is only practicable for vessels of deep draft between half flood and half ebb. Its entrance is 400 yards eastward of Petite Conchee Rock, between the Rousse and Ronfleresse Rocks, where the channel is less than 200 yards wide. The Petite Conchee is the only rock between Cezembre Island and Grande Conchee that does not cover at springs; the Rousse uncovers 33 feet and the Ronfleresse 28½ feet.

Directions.—The western side of Petit Bey Fort, seen between La Cite Citadel and the little fort on Bechard Point 161°, leads through the Petite Conchee Channel nearly up to the Crapauds du Bey Rocks, leaving the Rousse, the Rats, and the Queue des Rats westward; and the Ronfleresse, the Pierres aux Normands, and the Roches aux Anglais eastward. A red beacon, on a rock which dries 12 feet, marks the center of the Pierres aux Normands; and near the northern end of the Roches aux Anglais is a red beacon on a rock which uncovers 11 feet; the southeastern part of this latter reef is also marked by a red buoy moored within its edge.

The leading mark given passes within 50 yards westward of a sunken rock off the western point of the Ronfleresse, with only 3 feet at low-water springs. It must be kept on until St. Lunaire Mill or the mound on Bellefard Point opens out southward of Harbor Isle. The vessel will then be 300 yards westward of the beacon on the Anglais, and should haul more to the westward to bring the western head of Bizeux Islet in line with the high rock at the foot of Bechard Point bearing 158°, which mark leads between the Basse Sud-Est des Ouvras and the black buoy of the Crapauds du Bey up to St. Malo Road.

Crapauds du Bey—Buoy.—These rocks, marked by the black buoy on their northern side just mentioned, bear 327° 470 yards from Petit Bey Fort; they uncover 5 feet.

Grande Conchee Channel derives its name from the Grande Conchee Rock, and, like that of the Petit Conchee, can only be entered by vessels of moderate size between half flood and half ebb, and is chiefly used by those from the northeastward. The shallowest part, as with all the channels eastward of Cezembre, is that over the flats in front of Grand and Petit Bey Forts, where there is a depth of only 2 or 3 feet on the leading line at dead low water. The entrance is bounded on its western side by the Haies de la Conchee, the Rimponiere, and the Grande Conchee, and on its eastern side by the Rousses and the Plate; its position may be recognized by Grande Conchee Fort, which may be seen from a great distance.

Haies de la Conchee, Rousses, and Plate Rocks—Beacon turrets.—The Haies de la Conchee, 600 yards northward of Grande Conchee Fort, is a ridge of high rocks whose summits do not cover. The Rimponiere between the Haies de la Conchee and Grande Conchee dries 36 feet. The Rousses are rocks, of which one isolated head has only 6 feet water; the marks for it are the Grand Chevreuil, a high rock near the shore westward of Meinga Point, on which stands a kiosk, making it very conspicuous against the land, a little open southward of the guardhouse on the inner part of Meinga Point, and Roche Mill, in line with the eastern gable of the barracks of Petit Bey Fort 184°. The Plate, ½ mile 116° from Grande Conchee, uncovers 18 feet, and has on it a stone beacon turret 10 feet above the highest tides, painted in red and black hands. Although the sea is nearly always breaking on the Plate, its northern and western sides may be safely approached, but off its southern side are two small rocks, of which the Bouton, the most distant, uncovers 12 feet, nearly 300 yards 175° from the beacon turret.

Buoy.—The Bouton Rock is marked by a red and black buoy moored about 50 yards southward of it.

Several other patches are scattered about the entrance to this channel. The most dangerous are the Becfer, the St. Servantine, and the Rat de St. Servan. The Basse de Becfer, with 15 feet water, lies north 550 yards from the two northwesternmost heads of the Haies de la Conchee. The Basse de la Conchee, with 22 feet, bears 23° 1,600 yards from Grande Conchee Fort. The Rat de St. Servan, with 12 feet least water, lies 60° 1,300 yards, and the Teto, with 17 feet, the same distance 80° from the Grande Conchee Fort. The Rat du Rocher, with 15 feet, is 1 mile distant 63° from Grande Conchee Fort.

St. Servantine is a dangerous isolated rock, which uncovers 2 feet at the lowest tides; the marks for it are the summit of the Ronfleresse Rock on with the foot of Garde Guerin Point 231° and St. Hydeuc Steeple in line with a mill about 800 yards southward of it.

Bell buoy.—A red bell buoy is moored about 50 yards southeastward of the St. Servantine Rock.

As a guide to the depth of water over these shoals, it is useful to know that when the Ronfleresse is covered there is at least 4¼ fathoms over the St. Servantine and that when the rock on which the Plate Beacon turret stands is covered there is 5 fathoms over the Rat de St. Servan and about 5½ fathoms over the Rat du Rocher and the Teto Rock.

Directions.—When running for the Grande Conchee Channel from the eastward be careful to keep the mound on Garde Guerin Point open northward of the Petite Conchee 229° to pass northward of the Basse des Pointus, which has 18 feet of water, the St. Servantine, and the Rousses.

The leading mark to enter the channel is Mole des Noires Lighthouse touching the eastern side of Grand Bey Island 172°; this mark leads 350 yards eastward of Grand Conchee Fort and 540 yards westward of the Plate Beacon turret. Keep this mark on until abreast of the Roches aux Anglais, marked by a beacon and buoy, as already described, then haul to the westward round that buoy until the Crapauds buoy is on the port bow and steer about 223° between them, with Jeannet Mill (without sails) well open northward of St. Enogat steeple and in line with the fall of the high land bordering the eastern side of the Anse des Etetes; this mark leads northward of the Crapauds du Bey Rocks, but it may be necessary to haul a little more northward to clear the Crapauds buoy. When the western head of the Bizeux is on with the high rock at the foot of Bechard Point steer with these two rocks in line for St. Malo Road, as before directed.

A vessel may, if necessary, pass southward of the Crapauds du Bey Rocks by keeping Jeannet Mill exactly in line with St. Enogat Church.

A good leading mark for the Grand Conchee Channel from the offing, and one easily recognized, is the southwestern corner of La Cite on with the middle of Grand Bey Islet 75°. This mark, in entering the channel, leads rather close past the sunken dangers on its eastern side.

At night, in clear weather, vessels may enter by the Grande Conchee Channel; Grand Jardin Light, kept opening and shutting in with the southern side of Cezembre Island, leads northward of the St. Servantine up to the entrance; then, with the Mole des Noires Light opening and shutting in with the eastern side of Grand Bey, steer up the channel. When the high point of Dinard is still a little open westward of the Petit Bey, haul sharply to the westward to pass between the Roches aux Anglais and the Crapauds, observing that when the Mole des Noires Light, after having been masked by

Grand Bey, reopens and is about to be again masked by Petit Bey the vessel is nearly on the line of the Crapauds, and that when the light reopens westward of Petit Bey she is westward of them and may bear up 186° to enter the eastern limit of the Bas Sablons green light, and then steer for the anchorage in St. Malo Roads.

The Petits Pointus Channel is the next channel eastward of the Grande Conchee; its entrance is between the St. Servantine red bell buoy and the Grands Pointus Rocks, of which the highest head is 8 feet above high water, and is therefore an excellent mark for the entrance. The leading mark in is Petit Bey Fort, a little southward of the guardhouse on Dinard Point 202°. This line leaves on the starboard hand the Plate Rock and all the rocky patches named in describing the Grande Conchee Channel, the nearest of which, the Bouton, is passed at 550 yards, and, on the port hand, the Basse Tangui of 14 feet, 800 yards 26° from the Petits Pointus black iron beacon with cylindrical topmark; the Petits Pointus, of which the highest head, marked by the beacon referred to, uncovers 33 feet; the Letruns, a shoal 800 yards in extent north and south, which dries from 5 to 7 feet in patches and is marked near its southern edge by a red bell buoy; the Letrun d'Aval patch, which dries 5½ feet; the Dodehal, which dries 13 feet and is marked by a black beacon nearly 1,200 yards 91° from the Roches aux Anglais Beacon; the Petit Dodehal, which dries 3 feet, lying 600 yards 234° of the Dodehal; and a small rock awash at the lowest tides, *very* close to the leading line and situated between the Dodehal and Petit Dodehal.

This channel, as well as all those eastward of Cezembre Island, is only practicable for vessels of moderate draft between half flood and half ebb.

Directions.—Vessels from the eastward entering by the Petits Pointus Channel, when westward of the Basse Grune, should steer with the mound on Garde Guerin Point in line with Grande Conchee Fort 231°; this leads between the Grands Pointus and Basse des Pointus.

Having arrived within ½ mile of the St. Servantine red bell buoy, haul to the southward to bring on the leading mark for the channel just given, viz, Petit Bey Fort a little open southward of the guardhouse on Dinard Point 202° until the mark used when entering by the Grande Conchee Channel comes on, viz, Jeannet Mill (without sails) well open northward of St. Enogat Church steeple and on with the fall of the high land on the eastern side of the Anse des Etetes, when proceed as before directed.

By following the leading mark given a vessel passes 200 yards westward of the Basse Tangui, 150 yards westward of the beacon on the Petits Pointus, and 250 yards westward of the Letrun d'Aval.

The Bigne Channel is named after the Bigne Rock, 1,400 yards northeastward of Varde Point, and the highest rock in the vicinity of that point, its summit being 32 feet above the highest tides. This channel is not much frequented, but may be used by vessels of moderate draft with a leading wind, at springs, between half flood and half ebb. At neaps, it may be used by vessels drawing not more than 10 feet at all times of tide.

Rochefort Rock—Beacon turret.—The Rochefort Rock lies 1.5 miles northwestward of Meinga Point, and, with the Platier Ledge which dries 3 feet, forms a rocky group 550 yards long 50° and 230° and 200 yards wide. The highest head of the Rochefort shows at about 2 hours ebb, uncovers 34 feet at the lowest tides, and does not cover at neaps. On it stands a beacon turret 13 feet above high water, painted in red and black bands, and surmounted by a ball. The marks for it are the guardhouse on the summit of Varde Point, its own breadth open westward of the Bigne 198°, and St. Vincent Belvedere on with the western bluff of Benard Point 161°.

The mound on Garde Guerin Point open northward of Grande Conchee leads northward of the Rochefort; and Parame Church in line with the Bigne leads westward.

Directions.—In steering for the entrance of the Bigne Channel between the Tintiaux group, northeastward of Meinga Point, and the Rochefort Rock, bring the Crolante Rock, which lies at the foot of Varde Point and uncovers 38 feet, on with the western side of Grand Bey Fort 222°. Run in on this line until the Bigne Rock bears 18°, or until St. Lunaire Mill is in line with Bellefard Point 237°, when keep it so until St. Jeannet Mill (without sails) opens northward of St. Enogat steeple; then proceed as before.

The first mark leads 200 yards southeastward of the Basse aux Chiens, which lies ½ mile southeastward of the Rochefort and uncovers 3 feet; about the same distance from the Basse de Durand, lying 1,200 yards southward of the Rochefort with only 1 foot water; and, about 100 yards southeastward of the Petite Bigne, marked by a red beacon at its eastern end. On the other hand, it leads within 100 yards of the reef extending from the Durand, of which some rocks dry 12 feet; and, at a greater distance outside the Aiguillon and Graine-de-Lin Rocks, the former uncovering 21 feet, the latter 12 feet. The second mark leads 200 yards northward of the Crolante and of the Cancalaise, a little rocky ridge which uncovers 9 feet; and about 100 yards southward of a small rock, uncovering 5 feet at the lowest tides, off the southern end of the Letruns, and the same distance from the red bell buoy about 100 yards westward of it. The third mark leads northward of the Crapauds du Bey as on entering by the Grande Conchee or Petits Pointus Channels, but leads very close to the rock awash northeastward of the Petit Dodehal.

It is useful to know that when the Petite Bigne covers there is a depth of more than 19 feet over the tail of the shoal extending northward from Grand Bey Fort, which is the shoalest part of this channel.

Vessels sometimes enter the Bigne Channel with St. Malo Church in line with the Bigne Rock about 212°, and run in on the eastern side of the Rochefort until within 500 yards of the Bigne, then edge away southward, to round the Petite Bigne at a safe distance, and then bring on the leading marks already given, and proceed as before.

The tides in this channel between St. Malo and Varde Point never have much strength; they run strongly, however, northeastward of that point.

General directions—To St. Malo from the westward.—When bound to St. Malo from the westward, with southerly winds, Ushant and the French coast may be kept aboard, but with northerly winds and at night a prudent distance should be maintained offshore until the Sept Iles and Heaux Lights are made out. With the assistance of these lights a position may be obtained about 4 miles northward of the Heaux, from whence a 111° course for about 33 miles, following the directions previously given, leads northward of the Roc'h ar Bel and Horaine Ledge, and crosses the meridian of Cape Frehel about 6 miles northward of the cape. The vessel is then in a good position to run for the entrance of the Rance through the Decolle passage or Grande Porte Channel, according to the state of wind and tide.

This route may be followed either with the flood or against the ebb with the wind from north by east round by west to south, but if between southwest and south it is better to give Cape Frehel a closer berth. With a fresh leading wind, a sailing vessel passing the meridian of Heaux Lighthouse at the commencement of the flood, or five hours before high water at St. Malo, should enter the Rance by high water, the distance being about 43 miles, but with a foul wind it takes two flood tides to make the passage.

With a head wind make short tacks in sight of Heaux Lighthouse until the commencement of the flood, then stretch into the channel between the Barnouic and Roc'h ar Bel. The boards in this channel should not exceed 2 miles in length, but when eastward of the Horaine they may be extended to 7 or 8 miles. By following these directions Cape Frehel should be made toward the latter part of the flood, and the vessel may anchor or make short tacks under shelter of the cape during the ebb, or, if not so far to windward, she may anchor in the Rade d'Erqui, weigh again when the flood makes, and work up so as to reach, if possible, by about half flood, one of the entrance channels to the Rance.

To St. Malo through Grand Ruet Passage.—The channel between the Roches Douvres on the west and Guernsey, Jersey, and the Minquiers Ledge on the east, called by the French pilots the

Grand Ruet, would seem from its great breadth to offer a safe and easy route to St. Malo or Granville. The streams, however, run through and across it with such velocity at springs that during westerly winds, with stream and wind in the same direction, a sailing vessel runs great risk of being drifted between the islands and dangers in their vicinity; and if surprised by fog or night the danger is imminent, the constant changes in the set of the stream making the dead reckoning unreliable. At springs, with a westerly wind and flood tide, ships should keep well to the westward, make the coast of France about the Sept Iles, and proceed southward of the Barnouic Ledge, as already described; but at neaps, with a steady northerly wind, irrespective of tide, or at springs, with an ebb tide and a westerly wind, a vessel may use this channel with due care as follows:

With a steady westerly wind, and being about 8 miles 231° of Hanois Light, off the western end of Guernsey, at the commencement of the ebb stream or 2½ hours after high water at St. Malo, steer 156° for about 38 miles, or until within 6 or 8 miles 321° of Cape Frehel, when St. Malo may be steered for, as before directed.

This course leads about 4 miles eastward of the Roches Douvre, and its lighthouse should be sighted to correct the reckoning, 6 miles eastward of the Barnouic Ledge, and about 8 miles westward of the Minquiers. During nearly the whole of this run, the wind being on the starboard side counteracts the effect of the stream, which for the first four hours will be on the port beam, the fifth hour a little on the bow, and at last on the starboard beam, the flood beginning earlier as the French coast is neared.

To St. Malo through the Deroute Passage.—The shortest and best route from Cape de la Hague to St. Malo, with fresh leading winds, is through the Race of Alderney and between Jersey and Serk, through the Deroute Passage, the distance being about 75 miles. It should not be used, however, by strangers at night during light winds or in thick weather.

To take this route under the most advantageous circumstances, endeavor to enter Alderney Race on the slack or last of the northeastern stream, which is about 4 hours after high water at St. Malo. Having cleared the Race, steer about 209° to enter the Deroute Passage in midchannel and to insure passing southeastward of the Blanchard Rock. This distance being run in about 2½ or 3 hours, or about the time of low water at St. Malo, continue the course so as to be in a good position westward of the meridian of the Minquiers at the first of the flood. This stream is felt more as the vessel advances southward; it is therefore most necessary to determine by correct bearings the course to be steered, and to pay strict attention to the directions given hereafter in passing those dangers. When clear of the Miniquiers steer for Cape Frehel, where pilots are always on the lookout.

To St. Malo through the Cotentin Passage.—Full directions are given hereafter for this passage when bound to Granville; the same directions should be followed for St. Malo until the vessel has arrived within 4 or 5 miles of the beacon turret on the Etat, a remarkable rock on the northern edge of the Chausey Group, which group is described in the following chapter, when she should keep to the westward so as to round the northwestern part of the group about 1.5 miles distant.

When abreast of the Rondes de l'Ouest, a rocky ridge forming the western end of the group, steer 209° or more southerly, keeping within 3 miles of the rocks until the ruins of the old castle on Grande Ile open southward of the Corbiere, the high and remarkable rock at the southwestern extreme of the Chausey Group, on a 91° bearing; then steer about 203° for one of the channels into the Rance. Great care must be taken to make proper allowance for the set of the tidal stream, which, in clear weather, can easily be done by frequent bearings of objects on the Chausey Isles.

At night, when Chausey Light is sighted, steer for it on a 198° bearing until within about 2 miles of the Chausey Group, when Granville Light should bear 136°; then keep to the westward so as to round the rocks at that distance. When abreast of the western end of the group haul to the southward, taking care not to approach the rocks within 2 miles; and, if the night is clear, by the time Chausey Light bears 63° both the Herpin and Grand Jardin Lights will be in sight. By the aid of these two, and of the St. Malo leading lights, the port may be entered at once by the directions already given; or, if preferred, a position may be maintained off the port to await daylight.

From St. Malo through Cotentin Passage.—Vessels leaving St. Malo and intending to take this route should so time their departure as to enable them to enter the Cotentin Passage with the first of the northeastern stream, which makes 3½ hours before high water at St. Malo.

From 1 mile northward of the Grande Conchee, steer about 29°; this line passes about 2.5 miles northwestward of the Rochefort Beacon turret and 4 miles southeastward of the Sauvages, due allowance being made for tide. When within 3 or 4 miles of the Corbiere Rock, steer to pass about 1.5 miles westward of the Rondes de l'Ouest and clear of Corbiere Bank. Round the northwestern end of the group at the same distance, passing about 2 miles southeastward of the Ardentes, and, when Gros-Mont semaphore is on with the Enseigne Beacon tower 172°, steer to the eastward to bring the Etat and Huguenans Beacon towers in line 175°; this mark on astern leads northward between the Shamrock Knoll and Basse le Marie. when follow the directions given hereafter.

If after the first quarter flood and unable to weather the western end of the Chausey Group, bear up and pass around the eastern end, where, by that time, there will be a good rise of tide over the numerous shallow patches by which that part of the channel is encumbered. Granville Church, in line with the northernmost chimney of the southwestern barrack, keeps a vessel ½ mile northward of the Videcoq Rock, marked by a red and black bell buoy, and Coutances Cathedral in line with Mont Martin Church 40° leads between the Haguet and Admiralty Banks, but over and among patches with as little as 2 feet at low-water springs, when southward of the latter.

From St. Malo through the Deroute Passage.—Vessels of deep draft bound eastward leave St. Malo Road when the flood begins to slack; and with a fair wind, when clear of the Rance, they may adopt the Grand Ruet Passage; but, with the wind between south and west, the distance may be much shortened by running through the Deroute Passage and the Race of Alderney. A vessel averaging 7 knots should reach the middle of this passage in 6 hours after leaving St. Malo, and from thence, steering for the Race with a fresh, fair wind, may stem the remainder of the southwestern stream. The Race would then be entered a little after the commencement of the northeastern stream. French coasters generally adopt this route, and to insure entering the Race on the slack or last of the southwestern stream they sometimes wait for a leading wind at anchor under the Ile des Ehbiens.

Roteneuf.—This little harbor, about 4 miles eastward of St. Malo and midway between Varde and Meinga Points, has a narrow entrance, but opens out into a space about 0.75 mile wide and 0.5 mile deep, but it is choked with sand, over which the tide only begins to rise at half flood; the approach also is rendered dangerous by several rocks, which cover. Vessels of 15 or 16 feet draft may beach within it at high-water springs, but they must keep within 50 yards of Benard Point, the high bluff eastern point of entrance, when passing it. Vessels ground and lay up for the winter in the creek eastward of this point, where the bottom is everywhere of sand and the shelter excellent.

A remarkable tree, open eastward of a large house, leads up to the entrance of the harbor, passing eastward of the Rochefort and westward of the Hautieux and Guimereux Rocks; the Hautieux uncover 25 feet, the Guimereux, lying between the Hautieux and Benard Point, uncover 23 feet.

Semaphore.—There is a semaphore station on the summit of Benard Point.

Off-lying rocks.—Three off-lying rocks, always covered and very dangerous to deep vessels, lie off this part of the coast eastward of the Rochefort Rock; they are the Basse Rault, Basse Grune, and Basse du Nid.

Basse Rault.—This rocky head lies 1.5 miles 57° from Rochefort Beacon turret, 352° 1.5 miles from Meinga Point, and 269° 5 miles from Pierre de Herpin Lighthouse. It has only 16 feet of water, with from 7 to 9 fathoms around it, and should be carefully avoided at low water by vessels of deep draft, as also by small craft when it blows hard, as it then causes a dangerous swell.

The marks of the Rault are the mound on Garde Guerin Point, a little open southward of the Rochefort Beacon turret 234°, and the eastern slope of Meinga Point, almost shutting in Terquete Belvedere. The mound on Garde Guerin Point in line with Grande Conchee Fort 231°, leads northward; and Mont St. Michel, on with the Herpin Rock 113°, leads well northeastward of it.

Basse Grune is a dangerous isolated rock, with only 7 feet water on it and from 8 to 10 fathoms close around, lying 291° 3.5 miles from Pierre de Herpin Lighthouse, with Rochefort beacon turret a little southward of the mound on Garde Guerin Point; Granville Church perceptibly open southward of Granville Lighthouse, and Cancale Church its own length open westward of the eastern Haut-Bout Mill 158°. This rock occasions great overfalls even in moderate weather, and is much in the way of vessels from the westward bound to Granville or Cancale Road.

Granville Church open northward of Granville Lighthouse 68° leads well northward of the Basse Grune; Garde Guerin Mound on with Grande Conchee Fort leads ½ mile northwestward; Mont St. Michel in line with the Herpin Rock 112° leads southward between it and the Basse du Nid, and a vessel is eastward of it when Cancale Church opens eastward of Haut-Bout eastern mill.

In moderate weather vessels of any draft may pass between the Grune and the Nid at all times by keeping Mont St. Michel in line with the Herpin Rock bearing 112°. The lights of Cape Frehel, Pierre de Herpin, Granville, and Chausey are all visible from the Basse Grune.

Basse du Nid, a small, rocky patch about a mile 186° from Basse Grune, and 1.5 miles 85° from the Rault, has 17 feet water over it, and depths of from 8 to 9 fathoms around. From this patch, Meinga Point bears 220° 2.3 miles; Herpin Lighthouse 91° 3.3 miles; St. Malo Church tower is seen over Varde Point touching the Petit Chevreuil: and Mont St. Michel is on with the rocks extending from the northern point of Landes Island. Mont St. Michel in line with the Herpin Rock 112° leads well northward of it.

When the Pierre de Herpin Rock, on which the lighthouse stands, is covered, there is a depth of at least 37 feet water over the Grune and 46 feet over both the Rault and Nid.

The Tintiaux are a group of rocks about 1.3 miles long 96° and 276°, and ½ mile wide, their western end lying 800 yards northeastward of Meinga Point. Most of the rocks appear at 4 hours ebb, and the highest, near the center of the group, dry about 30 feet at low water, springs, and do not cover at neaps. Rochefort beacon turret in line with Cape Frehel Lighthouse, or on with Grande Conchee Fort, leads northward, and Duguesclin Fort, bearing 86°, or Haut-Bout eastern mill in line with the guardhouse on Verger Point, the eastern point of the first sandy beach westward of Grouin Point, leads eastward.

Tintiaux Passage, between the Tintiaux and the land, is used by coasting vessels with southerly winds; the tide runs very strongly through it, but follows the direction of the channel. The leading mark when coming from the eastward is the Bigne Rock, midway between Grand Jardin Lighthouse and the southwestern point of Cezembre Isle 251°; this leads 100 yards southward of all the Tintiaux and between them and the northern rock of the Cadins, which dries 3 feet. Give Meinga Point a berth of 500 yards in passing, and then run out between the Tintiaux and the Basse aux Chiens, with St. Vincent Belvedere, on the heights at the head of Roteneuf Harbor, touching the eastern part of the highland of Benard; or if entering St. Malo, bring the leading marks on for the Bigne Channel if the tide is sufficiently high to take that passage.

The coast.—Meinga Point, 3.8 miles westward of Grouin point, is very remarkable; it is nearly as high as Cape Frehel, is narrow and steep on all sides, and extends in a slope more than ½ mile northward. Between it and Grouin Point the coast presents nothing worthy of notice with the exception of the small bay between Nez and Nid Points, where, in its southeastern part, is a sandy beach defended by Fort Duguesclin. This fort stands 600 yards westward of Nid Point on a rocky islet joined with the shore at low water by a ridge of rocks.

Vessels of deep draft should keep well offshore between Points Meinga and Grouin; indeed, as previously stated, the navigation of this coast is so fraught with danger, both from its numerous rocks and strong tides, that the safety of his vessel calls for the utmost vigilance on the part of the mariner.

Telegraph-cable beacons.—Two beacons are established near Nid Point, 1.5 miles southwestward of Pointe de Grouin, to mark the shore end of a telegraph cable. The beacons are painted with white and blue horizontal bands and have a round topmark.

Pointe de Grouin, the western point of Mont St. Michel Bay, is high, rocky, and precipitous on its northwestern and southeastern sides, but forms a narrow slope toward the northeast. The sudden change in the direction of the coast at this point is very remarkable and makes it easy of recognition at a great distance in the offing. Southward of the point are the two windmills of Haut-Bout.

Semaphore.—There is a semaphore station near the extreme of the point.

Northwestward of Grouin Point and Peninsula are many rocky patches extending out more than ½ mile from the shore, and on the northern side of one of them, the Grande Bunouze, at about 800 yards northward of the point, is a small red buoy with conical topmark. On the eastern side of Grouin Point, Landes Island, with the Herpin, Pierre de Herpin, Fille Rock, and a few shoal patches extending 2 miles eastward of the point, form a broken, rocky barrier through which vessels pass when seeking shelter in Cancale Road or in the anchorage off La Houle.

Ile des Landes.—This high, narrow, rocky islet, steep on all side and inaccessible when there is any swell on, lies 400 yards eastward of Grouin Point, and at high water is about 800 yards long northeast and southwest and about 200 yards wide; but at low tide it is lengthened 600 yards to the 6° by some rocks then high above water and by others which are covered. Its direction is nearly parallel with the shore, from which it is separated by a channel called the Vieille Riviere, only 164 yards wide at its narrowest part, through which, at springs, the stream runs 6 knots. The eastern side is steep-to from end to end, there being from 18 to 20 feet water alongside the rocks. On the northeastern part of the island are the ruins of a fort and guardhouse. The Pignonet Rock, with only 10½ feet, lies in midchannel between the northeastern extreme of Landes Island and the Herpin Rock.

The Herpin Rock is a high pyramid rock about 66 feet above the level of high-water springs, and its base 200 yards in diameter at low water. It bears 49° 1,500 yards from Grouin Point and is nearly 400 yards from the northeastern extreme of Landes Island; its shape, great height, and isolated position render it a remarkable object from a great distance.

Coasters find shelter under this rock with the wind from west round by south to east. There is also good anchorage in depths of from 7 to 9 fathoms with the rock bearing 293° distance from 1 to 1.5 miles; the ground, however, so far out is rather coarse.

Pierre de Herpin.—The highest head of this small, rocky ridge. on which stands the lighthouse, uncovers 32 feet and bears 43° 1,600 yards from the Herpin Rock. At springs it begins to show at about one-third ebb; at neaps it does not cover. Another rocky ridge, with from 22 to 24 feet water, lies 153° 500 yards from the Pierre de Herpin.

Light.—From a circular lighthouse, 81 feet in height, on the Pierre de Herpin, at an elevation of 61 feet above the level of high water, is exhibited a light showing fixed white. The light is visible 13 miles.

From this lighthouse Cape Frehel Light bears 265° 20 miles, and Granville Light, Pointe du Roc, 51° 10.3 miles.

Fog signal.—From the outer gallery of the lighthouse a foghorn is sounded.

The passage between the Pierre de Herpin and the Herpin Rock, called the Grand Ruet, is the principal entrance to Cancale Road from the northwestward, but the Basse du Milieu, a shoal with only 4 feet 248° 530 yards from the lighthouse, narrows this passage to 400 yards; the channel through is otherwise deep enough for vessels of any draft at all times. They should, however, pass within 200 yards of the Herpin on the flood, as this stream sets strongly over the Basse du Milieu and Pierre de Herpin; the flood begins to make through the passage about 5¾ hours before high water at St. Malo or Granville, and as it runs southeast by east and east by south there is no danger of being drifted over the Banchets.

The Fille Rock—Bell buoy.—This rock lies 51° 600 yards from Pierre de Herpin Lighthouse, and is the easternmost of these dangers; it uncovers 11 feet at the lowest tides, and a bell buoy with red and black bands marks its northern side. From the rock Grouin Point bear 229° 2 miles; the summit of the Herpin Rock is in line with the northern head of the Pierre de Herpin; and, Bigne Rock appears between the Grand Chevreuil, half hidden by Point Meinga and Cezembre Island.

When the Pierre de Herpin covers there is a depth of 19½ feet on the Fille, and a vessel is northward of both when Grouin Point is open northward of the Herpin Rock and southward when the point is open southward of the Herpin. Cape Frehel in line with the Herpin also leads southward.

There is a depth of 8¾ fathoms in the passage between the Pierre de Herpin and the Fille, and it may be safely used by keeping from 300 to 500 yards from the lighthouse; but this passage places a vessel too much to leeward if seeking shelter from strong westerly winds in Cancale Road.

Banc des Renardieres, of from 6 to 7½ fathoms, sand and shells, bears 316° 1.8 miles from the Herpin Rock; it is ½ mile in length 333° and 153°, and 200 yards in width, but lying nearly across the streams it causes a heavy sea on a weather tide. From its shoalest part at the southern end the fort near Varde Point appears midway between Grand and Petit Chevreuil 234°; and the Herpin Rock is in line with the northeastern extreme of Pointe de Gogre, Mont St. Michel Bay.

Southeastward of Grouin Pointe, between it and Pointe de la Chaine, is the Grande Rade de Cancale, already referred to and presently described. Besides the dangers extending eastward from Grouin Point, of which the Fille Rock is the most eastern, there are, on the western side of the road, the Banc de Chatry, on the northern side the Banchets Shoal, and on the eastern and southern sides the Brehaut, Corbieres, Ile de Rimains, and other rocks inshore, of which the principal are the Petit Rimains and the Chatellier, above water; a large rock near Chaine Point which uncovers 22 feet and is marked by a beacon; and the Thomen Rock within low-water mark off La Houle, marked by two beacons on its northern heads.

Banc de Chatry runs parallel with the shore and bounds Cancale Road on the west; it has from 6 to 9 feet for a distance of ½ mile on its shoalest parts and is joined to the coast at Chaine Point by a bed of sand, over which there is 11 or 12 feet water; its northern end is abreast of a small creek named Port Mer, leaving between it and the shallows extending from the shore the Fosse de Chatry or Chatry Deep, a swashway 600 yards wide, in which the depths are from 26 to 32 feet.

From the northern part of the bank Haut-Bout eastern windmill is on with the northern declivity of Chatry Point, and from its eastern edge the Cormorandiere and the Hubert, two remarkable rocks adjoining Rimains Island, are in line; the Cormorandiere, at the northern extreme of the island, is high and pointed; the Hubert, about 150 yards eastward of the fort, is wedge-shaped.

The Banchets.—This bank of sand and broken shells of from 10 to 24 feet of water lies in the fairway of the entrance to Cancale Road, 600 yards northward of the Banc des Corbieres and 96° 1,400 yards from the old fort on Landes Island; together with the small knoll of 23 feet at 400 yards on its northwestern side, it is dangerous to vessels of deep draft at low-water springs. The bank is 1,100 yards long 333° and 153°; the shoalest parts form two small ridges parallel with each other and athwart the direction of the streams. On the northwestern ridge the depth is 12 feet, and there is only 10 feet on the highest part of the other, near the eastern part of the bank. The marks for the 10-foot ridge are the steep point of Chateau Richeux open 1° eastward of Chaine Point, and the slope of Grouin Point open the same distance northward of the guardhouse on Landes Island. The sand forming this bank is said not to shift, but there is reason to think that the depths often change during strong gales.

The mark for the small knoll of 23 feet of water is Haut-Bout eastern mill in line with the northern point of Port Mer Bay. The mill just open southward of the point leads between this knoll and the Banchets, and on with the summit of the same point leads northward of the knoll. There are two other knolls, with 24 and 25 feet water, a cable northward of the Banchets.

The Brehaut is an extensive flat of sand and rock southeastward of the Banchets and ½ mile eastward of the northern part of the Banc des Corbieres; the depths are from 7 to 10 fathoms. but as the ground is very foul it should be avoided.

Banc des Corbieres, bounding Cancale Road eastward, is about 1.5 miles long from the line of Haut-Bout eastern windmill on with the northern declivity of Chatry Point to the same windmill in line with the Cormorandiere Rock; it is about ½ mile wide and is joined to the sandy shore of Mont St. Michel Bay by flats, on which the depth decreases gradually from 20 to 8 feet, and from thence to the sands, which dry.

The general depths on this bank are from 2 to 4 fathoms, but a small patch about 600 yards long north and south, with only 10 feet water, rises on its southern part about ½ mile eastward of the fort on Rimains Island. From the northern end of this patch the guardhouse on Chaine Point is in line with Cancale Church steeple, and from the southern end the steeple is between the Chatellier Rock and Petit Rimains Islet, which joins the northern end of that rock at low water.

Grande Rade de Cancale.—This excellent anchorage is northward of Rimains Island, 1,400 yards from the shore between Chatry and Corbieres Banks; it affords good shelter for ships of deep draft during westerly winds. A vessel should moor north and south with open hawse to the westward, and the best holding ground is with the Cormorandiere Rock seen between Rimains Island and the Hubert Rock; its eastern limit is the Cormorandiere touching the eastern side of the fort on Rimains, and its northern limit Haut-Bout eastern mill in line with the middle of Portz Picain, a small white sandy beach close southward of Chatry Point. Northeasterly winds sometimes cause a swell, but vessels are seldom obliged by sudden shifts of wind to quit this anchorage.

There is also good holding ground in the southern part of the road in from 4½ to 5 fathoms, clay and mud, about 400 yards eastward of Rimains Island, with Cancale Church steeple in line with the middle of Rimains Fort and Grouin Point a little open westward of Landes Island. A vessel under 10 feet draft may anchor southward of Rimains Island, with that island bearing north, distant about ½ mile. In running for this anchorage at low water keep within 500 yards of the island to avoid the 10-foot patch on the Banc des Corbieres. At this anchorage, if unable to ride out heavy weather from the northeastward, take the top of high water and run aground on the mud southward of Cancale Church with good sail on. Here both vessel and crew will be saved.

Mooring buoy.—A large mooring buoy is placed about 700 yards 133° from the southern end of Rimains Island. At ½ mile 189° from this end of Rimains there is a depth of only 4 feet at low-water springs.

Anchorage east of Banc des Corbieres.—Vessels of deep draft sometimes anchor eastward of the Banc des Corbieres, but they are less sheltered than in Cancale Road and more exposed to northeasterly winds, which when strong throw in a heavy sea, causing vessels to roll heavily on a weather tide. The anchoring ground extends southward from the line of Haut-Bout eastern mill in line with Portz Picain to that of Cancale Church steeple in line with the southern side of the Chatellier Rock.

The best berth is in depths of from 6 to 7 fathoms, blue tenacious clay, with Dol Church steeple on with the foot of the eastern slope of Mount Dol 169°, and Cancale Church steeple between the Chatellier and the fort on Rimains. This position is 1.3 miles outside Rimains Island, but the Corbieres prevents a nearer approach, consequently that island affords but little shelter from the westward. Vessels remaining any length of time at this anchorage should sight their anchors occasionally or they bury themselves deeply and are difficult to weigh.

Merchant vessels generally prefer anchoring southward of the Banc des Corbieres, where the holding ground is good and the depth from 19 to 22 feet. The best berth is close southward of the line of Haut-Bout eastern mill on with the Cormorandiere Rock 296° or with the mill between the fort and the northern point of Rimains Island; but the safest position is in the southern part of Cancale Road.

Anchorage in Fosse de Chatry.—Vessels of moderate draft may anchor here in from 4¼ to 5¼ fathoms, with Haut-Bout eastern mill in line with Portz Picain, and Mont Dol on with the eastern point of Petit Rimains, the little island just northward of the Chatellier Rock. This is a good anchorage during neaps, but at springs the streams run from 4 to 5 knots. Small craft may anchor a little more inshore, but not westward of the line of Mont Dol touching the western side of the Chatellier.

Vessels that can take the ground are well sheltered with the wind from northeastward round by north and west to south-southwestward on the deposit of soft mud, which borders the northern part of the little bay of Port Mer.

Light.—On Fenetre Rock, Port of Houle, Cancale, a fixed green light, visible 5 miles, is shown from a white circular tower at an elevation of 33 feet above high water.

La Houle, the port of Cancale, nearly dry at high-water neaps, but with 7 or 8 feet in it at springs, has been formed by connecting the Fenetre Rock with the shore by a short pier above the level of high water, and by a prolongation to the southward from that rock, with an elbow to the westward. The port has a large fishing industry and valuable oyster beds; its trade otherwise is insignificant. Its beaching places westward of the Fenetre are good and safe for small craft. The town of Cancale stands on the cliffs and La Houle at their feet; their united population is about 7,000. St. Malo is about 8 miles distant by road.

Directions.—When running from the westward for Cancale Road from a position about 2 miles 6° from Cezembre Island steer 63°, keeping the mound on Garde Guerin Point open northward of Grande Conchee Fort until Mont St. Michel opens off Grouin Point, then haul up for it and keep the Mont in line with the Herpin Rock bearing 112°; this leads between the Grune and Nid Shoals. When within about ½ mile of the Herpin Rock steer through the Grand Ruet, passing only 200 yards eastward of the rock if the flood is running, as that stream sets strongly over the Basse du Milieu and Pierre de Herpin, and from thence haul to the southward for the road.

The passages between Grouin Point and Landes Island, called the Petit Ruet, and that between the northeastern extreme of Landes Island and the Herpin are too dangerous to attempt without a pilot.

Pilots.—The Cancale pilots take vessels to the anchorages and beaching places of Cancale and Le Vivier, and they are authorized to pilot vessels leaving Cancale for St. Malo roadstead. They also meet vessels coming from the eastward for that port; that is to say, through the passage between Minquiers Rocks and Chausey Islands, or through that between these islands and Grouin Point. Pilotage outward from the anchorages and beaching places of Cancale is exclusively reserved for them.

Baie du Mont St. Michel, between Grouin and Champeaux Points which bear 80° and 260° from each other, distant 11 miles, is much exposed to northwesterly and northerly winds; the anchorages, however, off Cancale and La Houle in the northwestern part of the bay, as just described, afford excellent shelter against westerly winds. The head of the bay falls back a great distance southeastward; nearly three-fourths of it is occupied by an immense bank of sand which dries at low water, and a large portion does not cover at high-water neaps.

The coast.—On the western side of the bay the land is high for the space of 4 miles from Grouin to Chateau Richeux Point, and the coast generally steep. The low lands called the Marsh of Dol, begin at Chateau Richeux Point and extend 15 miles eastward to the mouth of the River Couesnon, the course of which separates the department of Ile-et-Vilaine from that of La Manche. A strong dyke protects this marsh from the invasion of the sea, its surface being in several places below the level of high spring tides.

The only remarkable rise on this part of the coast is the small isolated hill named Mont Dol, and a chain of hills, which, seen from the northward, seem to form a long promontory, of which the western extreme is known locally as Point de Gogre. Mont Dol rises from the midst of the marsh land 6 miles southeastward of Chateau Richeux Point, and on its flat top stands a windmill, a semaphore, and a few cottages. Point de Gogre is the nearest point to the sea of the chain of hills about ¾ mile inland between Mont Dol and the River Couesnon.

The little harbor of Vivier is at the mouth of the River Guyoul, 156° about 7.3 miles from Grouin Point; it can only be entered by the smallest coasters having good pilots. Mont Dol semaphore bearing 170° leads up to it. There is a small quay, alongside of which vessels lie to load or unload.

Small vessels can ascend the Couesnon River, at springs, as far as the town of Pontorson, but the navigation is difficult and seldom attempted. The entrance channel through the sands commences at the western foot of Mont St. Michel.

Mont St. Michel and Tombelaine Islet, rising from the sands in the eastern part of the bay, form by far the most remarkable objects on this part of the coast.

Mont St. Michel is a pyramidal block of granite 800 yards in diameter, which at the highest tides is completely surrounded, but from which at low water the sea recedes to a great distance, leaving dry sands for about 6 miles. Its summit is surmounted by large buildings and an ancient abbey church, of which the steeples are 420 feet above the level of the beach. It bears 158° nearly 7 miles from Champeaux Point, and in appearance strongly resembles Mount St. Michael in Cornwall.

Light.—A fixed green light is shown from the eastern point of entrance to the Couesnon River, about ½ mile from the Mont. This light is maintained by fishermen and is not exhibited unless a vessel is expected.

The Tombelaine is a barren islet almost as large as Mont St. Michel but much lower. It bears 1° 1.8 miles from the Mont, and, when seen from the northward or southward, has the appearance of a crushed pyramid inclining to the eastward. A deep sandy bight lies eastward of Mont St. Michel and Tombelaine, from the northern shore of which Tombelaine is distant 1.3 miles. The shore from thence continues very low for about 3 miles farther northward, until near Champeaux Point, when it begins to rise.

Champeaux Point is the eastern point of Mont St. Michel Bay; from it Pointe du Roc, Granville, bears 341° 5.8 miles. It is a bluff and almost perpendicular headland, unapproachable from seaward on account of the broad flats which dry out a long way from the shore, but very useful as a landmark, especially for vessels navigating between Chausey and Granville or bound northward by the Cotentin Channel.

Between Champeaux Point and Granville the coast curves slightly to the eastward and is generally of moderate height; but in some places it is low, sandy, and dangerous to approach with westerly winds, being bordered by a sand bank interspersed with flat rocks, which extend a mile from the shore. As Granville is approached these dangers become more marked, but as they especially concern the pilotage of that port a full description of them is given in the next chapter.

CHAPTER V.

GRANVILLE TO CAPE DE LA HAGUE, INCLUDING PLATEAU DES MINQUIERS AND ILES CHAUSEY.

Before proceeding to a description of Granville and the adjacent coast it will be well to give a detailed account of the vast beds of rocks and islets in the offing, which, in conjunction with the Channel Islands to the northward, render the navigation and all approach to the ports on this coast so exceptionally dangerous.

Plateau des Minquiers, situated 9 miles southward of Jersey and 13 miles from the nearest French land, both southward and eastward of it, is a tangled mass of reefs 16 miles in length east and west by 8 miles in width. The most dangerous part occupies a space near the middle, about 7 miles long east and west by 4 miles wide. The masses of rock at this part lie closer together in ridges and are higher, a large number being generally awash at high water. Only a few scattered rocks rise from 10 to 20 feet above that level.

These rocky groups are generally connected by extensive banks of shingle, gravel, and sand. There are, however, some narrow tortuous channels through this part of the reef, but from the strength of the tides and absence of good marks, those available being mostly so distant as to be useful only in the clearest weather, the pilotage is too difficult for any but the fishermen and passenger steamers plying between St. Helier and St. Malo, by whom they are frequented.

The whole of the sunken part of this reef eastward is studded with dangerous rocks, of which some dry 7 feet at low water, but a far greater number are either just awash or have not more than from 3 to 6 feet over them at that time. The sunken part of the western end of the reef has comparatively few dangers, and at that part of the plateau there is some good clear ground for anchorage in depths of 10 or 12 fathoms, so that a vessel set within the edge may anchor and remain until the turn of the stream favors her drifting away from it again.

The northwestern rocky mass of the high part is called the Pipette group; it is remarkable from having several flat-topped pillarlike rocks, and is a spot most fatal to shipping, more wrecks having taken place here than at any other part of the reef. The strength of the flood sets directly on it, and the stream is partially divided by it.

Of the rocks which never cover, the most remarkable in order of magnitude are Maitresse Ile, Maisons, Haute Grune, Faucheurs, Figuier, Red Frouquie, Blanc Roque, Calfateurs, Roches du Sud, Grand Vascelin, and Pipette Rocks.

Buoyage. — The buoys, all painted black, on the western and southern sides of the Minquiers are numbered in white figures and placed as follows:

1. A light buoy, exhibiting a fixed white light, moored about 1,600 yards 276° from the outer extreme of the Brisants du Nord-Ouest.

3. A pillar buoy, with a top mark, moored about 2.5 miles 175° from the above light buoy and 600 yards 30° of a small 5-fathom patch lying 282° 2.1 miles from Deree Francaise, which dries 3 feet.

5. (Withdrawn.)

7. The principal light buoy of the South Breakers, exhibiting a fixed white light 260 yards 218° from Deree Francaise, and about a mile south-southwestward of the outer point of the Brisants du Sud.

9. Another light buoy, also showing a fixed white light, 200 yards south-southwestward of No. 7.

Thus the Brisants du Sud are marked by an off-lying group of three buoys.

11. A pillar buoy, moored about 2.8 miles about 96° from the group of buoys last described, and about 230° of the Pointus Rocks.

13. A light buoy, showing a fixed white light, moored southwestward of Le Four Rock.

15. A pillar buoy, moored southeastward of the highest rock of Souarde Reef.

Maitresse Isle, near the southeastern side of the high middle part of the reef before referred to, about 200 yards in length and 100 yards in width, is the largest islet of the group; it is also the highest, although only 36 feet above high water. There is a little soil on this islet and some faint traces of vegetation, but it is quite destitute of fuel or subsistence of any kind, nor is there any fresh water except in the interstices of the rocks by rain. Stone was formerly quarried from the western part of the isle and used in the construction of Fort Regent, St. Helier.

There is a flagstaff near the highest part of the islet; also several small stone huts belonging to Jersey fishermen, who, during the summer season, which is eight months of the year, fish over all parts of the Minquiers Reef. From 16 to 18 boats are generally engaged in the lobster fishery, each boat containing two men; the boats lie on the southeastern side of the islet, where they receive partial shelter from the surrounding rocks. Vast numbers of lobsters are caught and sent to the London market; also congers and a variety of other fish, all of which find a ready market at Jersey.

The Maisons are three remarkably steep rocks with yellowish heads 276° 4.3 miles from Maitresse Isle; they are the highest and most conspicuous rocks at the western side of the high central portion of the reef, although not so high as Maitresse Isle, being only 33 feet above high water.

Haute Grune, south nearly 1 mile from the Maisons, rises from the center of a large mass of rock connected with the Faucheur by a reef, of which many of the highest heads are awash at low-water springs. The Haute Grune never covers, being 5 feet above the highest tides; it therefore serves as a good mark for other dangers in the neighborhood. The Grune de Norman, a reef of which the highest head uncovers 16 feet, extends 243° 1,200 yards from the Haute Grune. A pole beacon surmounted by a ball painted black marks the highest of the Grunes de Norman.

The Faucheurs is the name given to a large extent of rocks, of which three heads never cover; they lie west 3 miles from Maitresse Isle and 130° 1.8 miles from the Maisons; they are remarkable for their superior size as compared with other rocks in the neighborhood, and are therefore of great service as a mark.

The Figuier is a rock always above water 305° about 1.8 miles from Maitresse Isle.

Red Frouquie is a rock of nearly the same size, height, and character as the Figuier, about midway between it and Maitresse Isle.

Calfateurs are four small rocks, always uncovered, 200 yards eastward of Maitresse Isle, with which they are connected at low water.

Rocher du Sud is a large rock, always uncovered, 181° 800 yards from Maitresse Isle.

Grand Vascelin, 307° 3 miles from Maitresse Isle, uncovers 46 feet. This is a large flat rock with two heads always above water, very conspicuous for its size, and from its position a very useful mark. The Petit Vascelin bears 6° 1,400 yards from the Grand Vascelin and lies close to the edge of the reef near deep water, but, being 16 feet lower than the Grand Vascelin, it is covered for a considerable period during spring tides.

The Pipette Rocks are a group at the northwestern extreme of the high part of the Minquiers Reef. The two highest points uncover 45 feet, and are therefore always above water. The outer rock of the group is the Grand Haguet; it is 7 feet above high water and bears 293° 1,300 yards from the other high head of Pipette; 293° 5 miles from Maitresse Isle, 260° 2.3 miles from the outer part of Petit Vascelin, and 80° 2.5 miles from the Grune du Nord-Ouest.

St. Peter's spire, Jersey, over the quarry at Le Fret Point, leads over the rock.

The rocks just described are all within the limits of the middle or higher portion of the reef; westward of this part the most remarkable are Deree Anglaise, Grune du Nord-Ouest, Brisants du Nord-Ouest, Brisants du Sud, and Deree Francaise. Southward the danger line is marked by the Four, Souarde, and Sauvages. Eastward numerous sunken rocks extend nearly 6 miles from Maitresse Isle.

Deree Anglaise is a small cluster of rocks, of which the largest and highest dries 26 feet and lies 276° 2 miles from the Maisons, Maitresse Ile being on the same line of bearing. It is marked by a pole beacon with ball painted black.

There is a 3-fathom passage between this rock and the Maisons, but it lies very close past Deree and is only ½ mile wide; a long string of rocks extends from the Maisons westward for 1.5 miles.

Grune du Nord-Ouest, on the extreme northern edge of the Plateau des Minquiers, bears 260° 2.5 miles from the Grand Haguet, the outer rock of the Pipette Group, and 316° 1.3 miles from the beacon on Deree Anglaise. This rock dries 6 feet at low water; it is steep-to on its northern and eastern sides, but has numerous sunken rocks southwestward of it.

Brisants du Nord-Ouest, westward of which lies the lightbuoy, from the northwestern extreme of the Minquiers Reef and are connected with the Grune du Nord-Ouest by a rocky sunken ledge. The highest head of the Brisants dries 3 feet only and lies with the Faucheur and Haute Grune in line 111°. From a height of 30 feet, Maitresse Ile may be seen open northward of the Maisons, the apparent breadth of the latter; Grune du Nord-Ouest bears 77° 1.5 miles, the outer parts of the Pipette group and of Petit Vascelin being on the same line of bearing; and St. Ouen spire, Jersey, in line with the white Semaphore House on the high land of La Moye bears 12°. From this rock sunken reefs extend westward for the distance of a mile with from 1 to 2 fathoms water.

Clearing mark.—St. Ouen spire in line with La Moye Quarries, marked by a white streak on the cliff outside them, bearing 18°, leads 1,400 yards westward of all these dangers.

Deree Francaise consists of two rocks which uncover 3 to 5 feet nearly east and west 1,600 yards distant from each other. From the eastern rock, Prince's tower, Jersey, is seen touching the eastern side of Deree Anglaise 23°; and Maitresse Ile appears open southward of the Faucheurs, bearing 74°.

Brisants du Sud, marked by the group of buoys elsewhere described, are near the southwestern edge of the plateaux, 1.3 miles southwestward from the 3-foot (western) head of Deree Francaise, and 248° 9.5 miles from Maitresse Ile; they consist of a small patch of rocks with from 1 to 2 fathoms over them. Another small patch of sunken reef lies 700 yards 271° of this, and is the outer danger on this side.

The Pointus Rocks form an extensive reef about 2 miles 215° from the Faucheurs, of which many rocky heads uncover. They are 1.5 miles in length 288° and 108° and about ¾ mile in width.

Le Four, the highest head of a small group on the southern edge of the Minquiers, uncovers at half ebb and dries 18 feet at low water; upon it there is a pole beacon surmounted by a ball, painted black. From Le Four, La Moye white semaphore house, in line with the middle Maison Rock, bears 350°, and Chausey Lighthouse in line with the Corbiere Rock 98°. Southwestward of this rock is the light buoy described elsewhere.

The Souarde is a group of low rocks nearly a mile in length, with a break in the middle and a 9-foot patch a short distance to the southeastward, at the southern edge of the Minquiers; the highest head, near the eastern end, bears 96° 2.5 miles from the Four Beacon and dries 6 feet at low water; from it the Corbiere Rock, Chausey, in line with La Tour Point, bears 99°; and the Maisons Rocks are a little open westward of the Faucheurs 330°. The black pillar buoy, elsewhere described, is moored southeastward of the highest head.

The Sauvages are a cluster of dangerous rocks detached from the southern edge of the Minquiers Reef, their western end lying 2 miles 96° from the eastern end of the Souarde; they are 1,200 yards long southeast and northwest and 500 yards wide, with from 2 to 15 feet water over them. From the 2-foot rock near the middle, Chausey Lighthouse is a little open northward of the Corbiere 101° 7.5 miles; La Moye white Semaphore House, Jersey, is a little open westward of Maitresse Ile; and the town of Granville is wholly open southward of Chausey.

St. Peter's Spire, Jersey, in line with Maitresse Ile 341°, leads close westward of the Sauvages; Granville Church spire, open northward of Chausey Castle 105°, leads northward; Chausey Castle, open southward of Corbiere Rock, leads southward; and Terquete Belvedere, open eastward of the high land of Meinga Point, leads eastward, as does also Cancale Church, in line with Haut-Bout Mill.

The Cocq, 101° nearly 1.8 miles from Maitresse Ile, uncovers 15 feet; from the rock the southern extreme of Maitresse Ile and the Maisons are in line; and Champeaux Point is just in sight southward of Chausey Island.

This rock is the outer and most important danger southeastward of Maitresse Ile; La Ronde, the next in importance on this side, bears from Le Cocq 350° 1,100 yards and is awash at low water.

The Faucheur uncovers 26 feet 60° 1 mile from Maitresse Ile.

The Rat uncovers 12 feet 35° 1.8 miles from Maitresse Ile.

The Trois Grunes uncover 31 feet 46° ½ mile from Maitresse Ile flagstaff.

Grune de Turbot uncovers 13 feet 355° about 1.3 miles from Maitresse Ile. From this, the highest rock of the Turbot Group, a number of low rocks extend both northward and westward for 500 yards.

Grune Gauvin uncovers 4 feet at the west end of a narrow, rocky chain of less height, about ½ mile in length. It is about a mile within the northern edge of the Minquiers Reef, and 350° 2 miles from Maitresse Ile. From Grune Gauvin, St. Peter's spire appears a little open of Point de But and on with the eastern part of the town of St. Aubin beyond that point, bearing 341°.

The Demies uncover 17 feet 274° about 1.3 miles from Grune Gauvin, and 324° 2.8 miles from Maitresse Isle. From the eastern rock St. Peter's spire appears open eastward of Bergerie House 347°. A small reef nearly awash at low-water springs lies 96° 1,200 yards from the Demies.

The best passage into Maitresse Ile is between this rock and Grune Gauvin.

The Caux des Minquiers extend from the Rat Rock in an easterly direction for 4.5 miles, their eastern end, named the East Danger, forming the eastern extreme of the Plateau des Minquiers. The whole of this line is so thickly studded with rocks as to render the navigation among them perilous, even for boats, at low water; but, as none of the rocks dry more than 8 feet, there is never less than 11 feet over them at half tide; from half flood to half ebb, therefore, it is not at all uncommon for vessels of light draft to sail over them. Turnabout Rock dries 2 feet at low water, and is then the easternmost danger visible in this reef. From it Seymour Tower appears westward of Mont Orgueil, midway between it and Seymour House, 348°, and the Maisons and Figuier Rocks in line 260°; the reef extends beyond Turnabout Rock eastward as far as the East Danger.

East Danger, the eastern extreme of the Minquiers Reef, has only 3 feet water over it, and lies 66° nearly 6 miles from Maitresse Ile. From it the Maisons are touching the northern side of the Figuier Rock and Seymour Tower appears about midway between the inner part of Mont Orgueil Castle and St. Martin's Church 340°.

Buoy.—A red conical bell buoy, marked Les Caux des Minquiers, is moored off the northeastern side of the East Danger.

Directions.—As already stated, St. Ouen spire, Jersey, and La Moye Quarry Bluff, appearing as a white streak just westward of the white Semaphore House of La Moye, in line 18° lead 1,400 yards clear of the western extreme of the Minquiers Reef; St. Ouen spire a little open westward of the Corbiere leads 4 miles westward; Amas-du-Cap midway between cape Frehel Lighthouse and Tertre Morgan Mill 178° leads 1.5 miles westward of the reef; and the

Grand Larron Semaphore, St. Malo, on with the eastern end of Cezembre Island 141°, clears the southwestern extreme by more than 2 miles.

To clear the eastern end, St. Martin's spire and Seymour tower in line, 335° leads 1,400 yards eastward of the red buoy marking the eastern extreme of the reef. St. Peter's spire and Hermitage Rock, St. Helier, in line 313° is a wider mark, clearing the reef by 1.5 miles. Chausey Lighthouse in line with the beacon on Enseigne Islet 156° leads 400 yards eastward of the reef. Coutances Cathedral well open northward of Agon Church 89° leads 1,500 yards northward of all the foul ground in the neighborhood of the Caux des Minquiers. Eastward of East Danger the depth is 8 or 9 fathoms, gravelly bottom, and the soundings are tolerably regular.

In foggy weather or at night in rounding the western end of the Minquiers Reef from the northward during the flood a berth of at least 3 or 4 miles should be given it, and should anything less than 16 or 17 fathoms be obtained haul out to the westward at once.

The first part of the flood sets strongly over the reef, and no vessel should risk a near approach to its northern edge until four hours flood; after which the stream setting along and off the reef is no longer dangerous. Pipette Rock is always above water, as well as other rocks eastward of it; and during the first or dangerous part of the flood tide the sunken rocks westward throw up strong ripples.

To round the eastern end of the reef, if from St. Helier, Jersey, after clearing the dangers near that port bring St. Peter's spire a little open westward of the Hermitage to pass eastward of Icho Bank, which lies 2.8 miles southward of the coast of Jersey. When St. Martin's spire comes in line with Seymour tower run with that mark on past the red buoy marking the eastern extreme of the Minquiers, and when Maitresse Ile bears 260° either haul up westward to pass between the Minquiers and Western Ardentes or bear up eastward of the Ardentes. The Etat Beacon turret, Chausey, in line with Point de Champeaux 141°, or, if these can not be seen, a bearing of Chausey will lead eastward. To pass westward of the Ardentes, between them and the Western Ardentes, bring the Enseigne Beacon turret, Chausey, a little open eastward of the beacon on Grande Ile. The Maisons Rocks and Maitresse Ile in line also lead midway between the Ardentes.

The northern and western sides of the Chausey group are steep and may be safely approached to ½ mile. The Corbiere Bank, however, of 3½ fathoms, lies 1 mile from the western shore, having a 5-fathom channel inside it. When the Corbiere Rock, Chausey, bears 158°, a vessel is on the line of the Western Ardentes, after passing which she may round the western end of Chausey at about 1.5 miles.

Tides.—It is high water, full and change, at the Minquiers at 6h. 22m.; ordinary springs rise 37¾ feet; neaps 28½ feet above the level to which the soundings on the chart are reduced, which is 5 feet below the level of low water ordinary springs.

At and above half tide there is not less than 11 feet water over any part of the Caux des Minquiers. In moderate weather light draft vessels may then safely pass over them, provided they do not venture westward of Icho and Princes Towers in line 347°.

When navigating in the neighborhood of the Plateau des Minquiers the state of the tide and the effect of the tidal stream on the vessel's course must be most carefully considered and allowed for.

Tidal streams.—The strength of the easterly stream sets directly on Pipette Rocks and over the plateau of the Minquiers. The westerly stream slacks and the easterly begins at 2¼ hours after high water at Dover (or 7 hours after high water at Minquiers), and the westerly stream begins at 4⅔ hours before high water at Dover.

At about 2 miles northeastward of the Pipette Rocks, the direction and rate of the tidal stream is as follows: One hour before high water at Dover, 288° 2¼ knots; 2 and 3 hours before, 293° 2½ knots; 3½ hours before, 321° 1¾ knots; 4 hours before, 355° ¾ knot; 4½ hours before, 57° ½ knot; and 5 hours before, 80° ¾ knot. At high water, Dover, the stream runs 288° 2 knots; 1 hour after high water there, 282° 1½ knots; 2 hours after, 265° 1 knot; 2½ hours after, 119° ½ knot; 3 hours after, 108° 1 knot; 4, 5, and 6 hours after, 101° 3½, 4¼, and 3 knots, respectively.

The Ardentes, 7 to 8 miles east-southeastward from Maitresse Ile and 3.5 miles northward of the Chausey group, consist of two small banks of sand, shells, and stones, each having also a few rocky heads which dry 6 feet at low water; their western edge bears 101° 7 miles from Maitresse Ile. The banks are ½ mile apart, in a 96° and 276° direction, and are steep-to all around. The marks for the southernmost rocky head of the western bank are, Granville lighthouse in line with the southern side of the Etat rock 127°, or Granville Church thrice its own length open southward of the Canue; and the high land of La Tour Point, Chausey, wholly open eastward of the Enseigne beacon turret 157°.

Buoy.—A red buoy is moored off the southeastern extreme of the eastern bank of the Ardentes.

The Western Ardentes are about 1,400 yards southwestward of the Ardentes, and the bank is of much the same character as the latter, but no part of it ever uncovers; it has a general depth of from 15 to 18 feet, except over one rock near its western end on which there is but 5 feet at low water. This spot bears 336° nearly 3.5 miles from the Rondes de l'Ouest, the northwestern rocks of the Chausey group; and from it Mont St. Michel is in sight eastward of

Grande Ile 139°; the remarkable trees on Mont Huchon are nearly in line with Agon Church 66°, and Princes Tower appears a little open westward of Grouville Mill, which latter is somewhat difficult in recognition as it has no sweeps.

Nearly midway between the Ardentes and the Plateau des Minquiers there is another rocky ledge of from 1½ to 3½ fathoms. Between the Ardentes and the Chausey Isles there is a good clear channel with depths of from 7 to 9 fathoms, but great care is required in its navigation, owing to the strength of the tidal streams.

Anchorage is good near the middle of the channel, but to prevent danger in case of driving during the strength of the stream care must be taken to anchor clear of the line of tide of any of the dangers.

The Chausey Isles, lying between the Plateau des Minquiers and Granville, form an extensive group of little islets and rocks 7 miles long in a 96° direction from the Rondes de l'Ouest to the Founet, the easternmost rock; the group is about 3 miles in width and occupies a space of nearly 16 square miles. Grande Ile, Chausey, on the southern side of the group, is the principal and largest islet; from the lighthouse on La Tour Point, the southeastern point of the isle, Granville Lighthouse bears 104°, 8.5 miles; Maitresse Ile 302°, 11.3 miles; and Pierre de Herpin Lighthouse 178°, 8.3 miles. It is about a mile long 310° and 130°, 700 yards wide, and deeply indented by small bays, of which the projecting points are topped by hills; near its center, which is rather high, is some cultivated land.

On the southeastern part of the islet are the lighthouse, a chapel, and a fort; in the central part, the ruins of an old castle, a farmhouse, several cottages in which about 200 stonecutters reside, and two or three small blacksmiths' shops; and on the southeastern summit of Gros-Mont, at the northern end, is the semaphore station. The lighthouse and semaphore stand high and are prominent objects from seaward in all directions, showing well above all the other islets of the plateau. Grande Ile has several granite quarries, and a large quantity of granite is sent to France.

In July, August, and September there is a daily steamer to and from Granville. No regular communication at other times.

There are two small hotels on Grande Ile.

Longue Ile, 1,200 yards eastward of the lighthouse, is very useful as a mark in rounding the southwestern part of the group. On Ile de la Meule, 293° 1.5 miles from the lighthouse are the ruins of a convent and a well of good water. The western part of the group contains 15 or 16 islets and numerous rocks.

The Chausey group, although dangerous and intricate to navigate, is steep-to on the northern and western sides, but the southern side should be approached with caution, especially at low water, at which time the eastern side is quite inaccessible to vessels of deep draft, on account of the sand banks which almost close the channel between it and Granville.

The anchorage generally resorted to by vessels of war is Port Marie Road, off the southern side of Grande Ile. There are several harbors among the rocks completely sheltered from all winds, of which Chausey Sound, between Grande Ile on the southwestern side, and the Puceau and other rocks on the northeastern side, is most used; it is, however, very narrow, difficult of access, and only frequented by small Government cruisers, fishermen, stone boats, and other small craft capable of taking the ground.

Caution—Beacons.—The outer and exposed beacons on the rocks of the Chausey Isles are liable to be washed away.

Light.—Chausey Lighthouse is a square tower, 56 feet high, and stands on the summit of the hill which crowns La Tour Point, the southeastern extreme of Grand Ile; from it is exhibited, at an elevation of 121 feet above high water, a flashing white light, and being visible 17 miles. Chausey Lighthouse open southward of the Corbiere Rock leads southward of the Sauvages and of all the rocks in the southeastern part of the Minquiers Ledge.

The Corbiere is a high and remarkable rock at the southwestern edge of the Chausey group 276° 1.7 miles from the lighthouse and about ½ mile southwestward of Meule Islet.

Commencing with the Banc de la Corbiere in the west, and proceeding in order by the southern, eastern, and northern coasts, a description of the principal dangers which fringe the plateau of the Chausey Isles will now be given.

Banc de la Corbiere, off the western end of the Chausey Isles and composed of sand and shells, extends 1.5 miles in a 153° and 333° direction with an outward curve, and is about 400 yards wide. Its general depths are from 3½ to 4½ fathoms, the shoalest water being near the middle of the bank. From the southern end in 4 fathoms the Corbiere Rock bears 71° 1,600 yards; and from the shoalest part of 3½ fathoms the lighthouse is in line with the Corbiere 99°. Between this bank and the isles the depths are from 5 to 10 fathoms, the deepest water being near the isles.

The Cancalaise—Beacon.—The Cancalaise is the highest head of a small rocky ridge 500 yards from the southernmost rocks of the Chausey group, and in the space between are several rocky patches with from 1 to 7 feet only. The ridge is 200 yards long, east and west, and the highest head, at the eastern end, uncovers 12 feet at the lowest tides, at which time a rock is awash at the western end. A black beacon is erected on the eastern rock. The northern end of the eastern Ile des Huguenans touching La Tour Point 80° is the mark for the highest head (carried away, 1915).

To clear the Cancalaise when rounding the southwestern end of Chausey keep the Rondes de l'Ouest in sight westward of the Corbiere until the southern house on Longue Ile comes well open southward of La Tour Point.

Basse du Cancalaise, a rocky patch about 200 yards in diameter, lies 300 yards 85° of the Cancalaise; the highest head, on its western side, uncovers 6 feet, and another head, on the northern side, uncovers 5 feet. Between the Basse du Cancalaise and the Chausey Isles there are rocky heads which uncover from 4 to 8 feet.

Basse du Chateau, of which the shoalest spot bears 206° 900 yards from Chausey Lighthouse, is about 300 yards long 355° and 175° and 200 yards wide; it has 14 feet water at its northern end, 20 feet near the middle and 27 feet at its southern end, from which the highest and northernmost head of the Epiettes touching La Tour Point bears 26°. The Huguenans Beacon turret in line with the highest head of the Piliers 71° leads 400 yards southward.

Roches de Bretagne, about 200 yards southward of Bretagne Point, form a ridge 300 yards long 320° and 140° and 200 yards wide. The northern head of the ridge uncovers 16 feet, the middle head 14 feet, and the southwestern head 11 feet at low water springs, when there is a depth of 6 to 11 feet over the southern end of the ridge. The mark for the southernmost head of 11½ feet is the beacon on the Epiettes a little open southward of La Tour Point.

The Tour Patches are three small rocky heads about 400 yards southward of La Tour Point. The two westernmost patches have only 6 feet water, bear 1° and 181° from each other, and are about 50 yards apart. The eastern head has 11 feet water and bears 85° 100 yards from the southwestern patch.

Basse des Epiettes.—This patch, 100 yards in extent, has two small rocky heads with only 3 feet water. The Enseigne Beacon turret just in sight eastward of the eastern slope of Grande Ile 334° leads between the Basse des Epiettes and the Tour Patches, but directly toward the Tonneau Rock, which lies about 200 yards southeastward of La Tour Point and dries 12 feet.

Basse de l'Ile Longue is a rocky head with only 3 feet water 170° nearly 800 yards from Longue Ile and 116° 1,600 yards from Chausey Lighthouse. From it the Conchee Rock touching the southern end of the eastern Ile des Huguenans bears 71° and the northern and southern heads of the Epiettes in line bear 309°.

Fis-Cous and Basses du Fis-Cous.—Midway between Longue Ile and the Huguenans are the Fis-Cous and Basses du Fis-Cous, two rocky patches which may be dangerous to a vessel working along the southern side of the Chausey group.

The Fis-Cous is about 50 yards in extent, uncovers 9 feet, and is marked by a floating beacon. It bears 105° 1,300 yards from the southern end of Longue Ile and 215° 600 yards from the Grand Cheval Rock. A small rock, awash at low water, lies 200 yards eastward of the Fis-Cous.

The Basses du Fis-Cous, 200 yards in extent, lie about 200 yards westward from the Fis-Cous. One head of this danger is awash at the lowest tides, and others have only from 1 to 4 feet over them. Gros-Mont Semaphore, in line with Tourette Rock (the leading mark for the southeastern channel into Chausey Sound), 292°, leads very close southwestward of the Basses du Fis-Cous.

Iles des Huguenans—Beacon turret.—These are small islets on the southern edge of the Chausey group, 2 miles eastward of the lighthouse, and with a few rocks which join them at low water form a small rocky cluster 800 yards long 51° and 231°. On the summit of the Grand Huguenan, the largest and most eastern islet, is a stone beacon turret 29 feet in height, painted white, with a black band 6 feet below the top, which when in line with a similar turret on the Etat Rock 355° shows the western limit of the fishing grounds. The summit of the eastern islet is covered with grass, and sheep from Granville often graze there.

The Conchee.—This rock is ½ mile eastward of the Iles des Huguenans, on the eastern side of the Conchee Passage. Its summit is about 26 feet above the highest tides. The Basse de la Conchee uncovers 7 feet about 600 yards 80° from the Conchee.

Haute Foraine, 68° a long mile from the Conchee, is the easternmost high rock connected with the Chausey group, and is marked by a red beacon, with conical topmark, which shows 13 feet above high water. Its advanced easterly position renders it very conspicuous, and Granville pilots use it in estimating the height of the tide. It uncovers 28½ feet at the lowest tides, and when it covers there is from 15 to 16 feet water at the entrance of Granville Harbor. A sand bank of some extent, with 9 feet water, lies 600 yards northeastward of the Haute Foraine.

The Tomin is a small and dangerous rock which uncovers 18 feet at 500 yards southwestward of the Haute Foraine and a little northward of the line of the lighthouse on with the northern point of the eastern Huguenans.

The Pignon, an isolated dangerous rock 21° 1,200 yards from the summit of the Haute Foraine, uncovers 10 feet at the lowest tides and does not show at ordinary neaps. A floating beacon is moored on the southern edge of this rock. About 200 yards southeastward of it there is a flat with only 2 feet of water.

The Founet, the easternmost rock of the Chausey group, uncovers 6 feet; the marks for it are the Canue and Etat Rocks nearly in line 299°; Coutances Cathedral, its own breadth open eastward of Mont Martin mill; and the top of Conchee Rock perceptibly open southward of the little hillock which crowns the southern point of the eastern Huguenans.

Buoy.—The Founet is marked on its southeastern side by a red bell buoy.

Basse du Founet, an isolated rocky patch covered with 3 feet water only, bears 9° 350 yards from the Founet.

Clearing marks.—The summit of the Conchee Rock in line with Chausey Lighthouse 262°, or on with the Huguenans Beacon turret leads southward of the Founet, Haute Foraine, and Tomin Rocks; the Etat Rock, twice its apparent breadth, open northward of the summit of the Canue, leads northward of the Basse du Founet.

Even at low water springs Chausey pilots take vessels between the Founet and Pignon Rocks; but strangers should use this passage only at low water neaps or at two hours' flood at springs, and then only when the Haute Foraine is uncovered or its beacon plainly visible.

The Canue Rock lies 63° 3.5 miles from Chausey Lighthouse, and its summit is 6 feet above the level of the highest tides. Southeastward of the Canue a reef named Canuettes, many of whose heads dry from 7 to 24 feet, extends 1,200 yards in the direction of the Founet. A wooden beacon stands on the Canuette, one of these rocks about ½ mile 111° from the Canue Rock.

The Etat Rock—Beacon turret.—The Etat is a remarkable rock on the northern edge of the Chausey group. On its summit is a stone beacon turret, 29 feet in height, similar to that on the eastern Huguenans, which bears from it 175°; it is painted white with a black band 6 feet below the top. These turrets in line show the western limit of the fishing grounds, and are also of great use as a leading mark between the Marie Ledge and Catheue Banks northward of Chausey Isles.

From the Etat Rock Dechiree Ledge, at the northwestern extreme of the Chausey group, bears 275° 3.8 miles. The northern edge of the plateau, which is here steep-to, is indicated by several rocks which seldom or never cover, of which the Selliere, 1.5 miles westward of the Etat, is a useful mark; and by many more which uncover as the tide falls, of which the principal are the Petite Entree, which uncovers 36 feet and is marked by a beacon; the Grande Entree, which uncovers 38 feet; the Pointue, which uncovers 41 feet; and the Dechiree Ledge, of which the highest part uncovers 33 feet.

L'Enseigne—Beacon turret.—This small islet, about 18 feet above the level of the highest tides, is 1 mile nearly within the northern edge of the plateau and 2 miles northward of La Tour Point. It is remarkable from the uniform convexity of its surface, and has a white stone beacon turret on its summit, 29 feet in height, painted white, with a black band 6 feet below the top.

Rondes de la Dechiree, a rocky ridge at the northwestern side of the Chausey group, is 600 yards long in a 30° and 210° direction. The northernmost head uncovers 39 feet and the highest head, near the middle of the ridge, uncovers 44 feet, and therefore only covers at the highest equinoctial spring tides. There are several other low heads on the ridge; that at its southern extreme uncovers only 4 feet; from it the northwestern point of the Pointue Rock appears touching the southeastern extreme of the Dechiree 57°, and Chausey Lighthouse is in line with the Chapeau Rock 133°.

Basse du Chenal.—This small rocky patch, between the Rondes de la Dechiree and the Rondes de l'Ouest, lies exactly in the fairway of the entrance to the Rondes anchorage, is about 150 yards from the northern extreme of the Rondes de l'Ouest, and has only 5 feet water. The marks for it are the Pointue Rock, just open southward of the Dechiree, and the lighthouse, a little open southwestward of Gros-Mont Semaphore.

Rondes de l'Ouest is a rocky ridge, 1,200 yards long 6° and 186° and 400 yards wide, forming the western extreme of the Chausey group. Several of its heads never cover and serve as good marks for the southwestern limits of the group.

Anchorages.—Sound de Chausey, so called from the secure anchorage it affords to vessels of light draft, trends 310° and 130° along the eastern side of the Grande Ile and occupies a space 1,200 yards in length. At low-water springs it is surrounded by rocks and banks of sand and mud, which form a natural harbor where vessels capable of taking the ground find capital shelter; if remaining longer than one tide, or at springs, they should, however, moor head and stern to prevent tailing on the banks. The sound is sheltered on all sides except from 140° to 96°, and strong winds from that quarter throw in a heavy sea at high water. Fresh winds from north-northeast to northwest are also much felt, causing a heavy swell throughout the whole extent of the sound from one hour before until two hours after high water.

Depths.—Two entrances lead into Chausey Sound, one from the southward, the other from the northward; the latter dries as much as 15 feet in places, and therefore has from 20 feet at high-water springs to 11 feet at neaps. The southern entrance is the best, and is divided by the Epiettes Rocks into the south and southeast channels; the south channel has only 1 foot water in it at the lowest tides, but at high-water springs has 36 feet, and 27 feet at neaps. The southeast channel dries 6 feet and therefore has 7 feet less water than the south channel.

Although the deepest parts of the sound do not dry, there remains but little water in them, and the soundings are very irregular. There are, however, two narrow gullies with space for three or four short vessels of from 10 to 11 feet draft to remain afloat. The largest, at the entrance of the sound, is 325 yards long and from 55 to 65 yards wide, with depths of from 10 to 17 feet, but it is occupied by three mooring buoys for the use of the guard vessel protecting the fisheries. The second is only 173 yards long, with from 8 to 15 feet, and is a little northward of the former, in front of the farmhouse and chapel, and abreast of the Crabiere Rock, which uncovers 24 feet; this anchorage also is usually occupied by one of the fishery cruisers, secured with a mooring chain on each bow and quarter. The best place for grounding is on the lowest part of the beach between the Crabiere and Tourette Rocks, where the bottom is soft mud, but there are many scattered heads of rock beneath the mud, rendering the surface uneven and liable to damage vessels of any size; those up to 60 or 65 feet in length may, however, beach here in safety.

Directions.—The south channel, between La Tour Point and the Epiettes, is accessible to vessels drawing 10 feet when the Tonneau Rock covers, and has 12 feet in mid-channel at two hours flood. In taking this channel bring the Enseigne Beacon turret just in sight eastward of the eastern slope of Grand Ile 334°, which leads between the Epiettes and La Tour Patches. The beacon on the southwestern rock of the Epiettes may then be steered for and approached to within 100 yards; then steer northward in mid-channel parallel with the shore of the isle, passing 50 yards westward of the beacon (black and white bands) on the northern extreme of the Epiettes. If intending to run northward of the Crabiere, pass between its beacon and the beacon 100 yards eastward of it, giving the Crabiere a berth of at least 30 or 40 yards to clear the tail which runs out from it in that direction.

The southeast channel is eastward of the Basse des Epiettes; the leading mark is Gros-Mont semaphore in line with the Tourette Rock 292°. The Tourette is a short steep whitewashed point on the beach 200 yards northeastward of the farmhouse. When passing Longue Ile, to clear the ledge off its southern end, open the semaphore a little westward of the Tourette, taking care to bring them quickly on again after passing it. The mark then leads directly toward the Crabiere, passing the Loup Beacon, which stands at the northern end of the rock on the port hand, and the Oursiere Beacon, and also the Ebauche Beacon, on the western part of that ridge, on the starboard hand, and over a bank of mud which dries at low-water springs, northward of the Epiettes, when a vessel may either anchor or proceed as if coming through the south channel. The mud bank referred to completely bars the channel, and can only be crossed by vessels above 10 feet draft after 2½ hours flood. When the highest head of the Loup covers there is a depth of 16 feet water on this bank.

The north entrance into Sound de Chausey is northward of the Ensiegne, between the rocks extending 400 yards eastward of Pointue Rock and the Grande Entree; this latter is a small group of rocks, of which the highest head uncovers 38 feet, 650 yards eastward of the low rocks extending from the Pointue. The highest head of the Pointue uncovers 41 feet. The inner portion of this channel, southward of the Etardiere, is completely barred at low water by vast sand banks uncovering generally only a few feet, but between the Sauniere and Vieux they dry as much as 15 feet in places. Most of the rocks being marked by beacons, strict attention to the following directions render it safe of access between half flood and half ebb to vessels up to 10 feet draft; no stranger, however, should attempt such a channel without a pilot.

From the entrance the channel takes a southerly direction between the western edge of a rocky group named Longues, on the northwestern edge of which is a beacon, and the Basse de l'Etardiere, a flat rock at 400 yards distance, which uncovers 8 feet 200 yards eastward of the Etardiere, to which rock it is joined at low water, springs, by a sand bank; on the southeast end of the Basse is a red beacon with conical top mark. From thence the channel takes a 231° direction between the Etardiere Rock, which never covers, and the Enseigne, and then a southerly direction, leaving on the port hand the low rocks extending from the Petite Enseigne, the Sauniere, a small islet 56 feet above the lowest tides, and the Petite Fourche; and, on the starboard hand, the Massue and a rocky group eastward of the Vieux, and from thence to the sound. The Massue has a beacon off its northeastern extreme and a whitewashed rock at its southeastern; a rock with a beacon lies off the northern end of the Petite Fourche nearly in the fairway, and a vessel may pass it on either side.

In entering by the North Channel the leading mark is Chausey Lighthouse in line with the Enseigne Beacon turret 156°; keep the lighthouse, however, twice its breadth open eastward of the beacon turret while passing eastward of the low rocks extending from the Pointue and twice its breadth open westward while passing the Longues Rocks. In passing the Basse de l'Etardiere, when the two white patches on the Massue and the Chapeau Rocks are in line, or when the southern end of Meule Islet is just touching the northern end of the Massue 209°, run in that direction until the lighthouse is on with the southwestern point of Sauniere Islet 144°; this leads up to the Sauniere; give it a berth of 100 yards in passing, and also leave the beacon off its southern end close on the port hand, and after passing it steer in mid-channel between the beacons marking the rocks on either side of the channel abreast of the Gros-Mont.

Enseigne Anchorage is a small space where vessels of 10 feet draft, with good pilots, may find shelter afloat at low water from southwest, south, or southeast winds. With northerly winds no vessel should anchor there except to await water through the North Channel into Chausey Sound, as from its limited extent there is neither room to veer nor drive without tailing on the sandbank, which at low water dries 300 yards northward of the Enseigne.

Run for this anchorage through the north entrance with the same mark as if bound for Chausey Sound until the vessel is well southward of the Pointue; then bring the lighthouse on with the southwestern slope of the Enseigne, and when the southern end of Meule Islet touches the northern end of the Massue Rock anchor, and the vessel will be in the best berth and deepest water, 22 to 36 feet, sandy bottom, midway between the Basse de l'Etardiere and the Longue. Between half ebb and half flood great care must be taken to estimate the depth, as the soundings, when southward of the Pointue Rocks, vary from 7 feet only to 22 feet at low water, and also to avoid a small rock with only 4 feet, nearly in the fairway of the entrance.

Port Marie is a little bay between La Tour and Bretagne Points, in front of which, 400 yards offshore, is a small space capable of affording shelter from winds between 299° and 29° to two or three vessels of 10 feet draft.

Telegraph-cable beacons.—Two beacons have been established in Port Marie to mark the landing place of a telegraph cable. The beacons are painted with white and blue horizontal bands and have a round topmark.

Anchorages.—The inner anchorage off Port Marie, between the Bretagne Rocks and Tour Patches, is not more than 600 yards in extent. Approaching from the southwest bring the Etat Beacon turret on with La Tour Point 37°, or the northernmost and highest head of the Epiettes quite shut in by La Tour Point leads over the Chateau Patch, southeastward of the Bretagne Rocks and northwestward of the Tour Patches; and when Huguenans Beacon turret is in line with the Grand Cheval Rock 77° anchor in about 24 feet, sandy bottom.

From the southeastward the westernmost point of Grand Ile, forming Port Homard, touching Bretagne Point 316°, leads outside the Tour Patches and northeastward of the Chateau Patch and Bretagne Rocks. When the northernmost head of the Epiettes is shut in with La Tour Point anchor.

Port Marie Outer Road is a good anchorage for large vessels of war and is, in fact, the principal roadstead of Granville, the greater part of the shipping bound for that port remaining here until the water on the banks is sufficiently high to proceed.

The best position for a vessel of deep draft in this road is, with Chausey Lighthouse bearing 327° distant from ½ mile to a mile, in depths of from 7 to 11 fathoms. When at anchor Coutances Cathedral should be open northward of the eastern Huguenans, and the Enseigne Beacon turret should be open eastward of La Tour Point. Here a vessel will be sheltered from the wind if northward of 310°. Should it be inclined to draw more westerly, with an appearance of bad weather, the first opportunity should be taken to weigh and get to windward with the ebb or to run for shelter either to Cancale Road or to the eastward or northward of the Chausey group, according to the direction of the wind.

Conchee Anchorage.—With the wind from 288° to 6°, the Conchee Anchorage in 4½ or 5 fathoms is to be preferred. The marks for it are the old castle in ruins on Grande Ile in line with the Huguenans Beacon turret 271° and the Selliere and Culassiere Rocks in line 307°.

The Etat Anchorage.—With the wind southward of west, the anchorage under the Etat Rock should be resorted to. Anchor in a depth of 5 to 7 fathoms, distant 1,000 to 1,600 yards from the rocks, with Chausey Lighthouse in line with the Etat Beacon turret. With the wind nearing west there is more shelter off the Canne, but the water shoals toward the Catheue Banks. Indeed, all the northern shore of the Chausey group affords shelter against southerly or southwesterly winds, and, being bold, may be approached without fear.

Rondes de l'Ouest Anchorage, on the western side of the Chausey group under the Rondes de l'Ouest Ridge, is the only shelter the group affords to large vessels during easterly winds. It can be reached at any time of tide either from Port Marie Road or from the Conchee or Etat anchorages. When proceeding toward it from Port Marie Road keep Huguenans Beacon turret in line with the highest rock of the Piliers 70°, to pass southward of the Chateau Patch; and when Gros-Mont semaphore bears 23° haul gradually in, farther than to have the middle of Longue Ile in line with La Tour Point, to avoid the Cancalaise.

When the large and remarkable round rock of the Ronde de l'Ouest Ridge is in sight westward of the Corbiere haul in to within 500 yards of the rocks, passing between Corbiere Bank and the Chausey group, and anchor in a depth of from 7 to 9 fathoms, sandy bottom, ¼ mile westward of the Rondes de l'Ouest and the same distance northeastward of the Corbiere Bank, with the lighthouse midway between Gros-Mont and the western extreme of Grand Ile, or touching the southern end of Meule Islet and the Etat Beacon turret about midway between the Enseigne Beacon turret and the Grande Entree Rock 80°.

Anchorage between the Rondes de l'Ouest and the Dechiree.—This anchorage is similar to that of the Enseigne, and affords partial shelter with the wind from south round by east to northeast. It is about 600 yards long and 400 yards wide, and has from 3½ to 6½ fathoms, sandy bottom. The entrance, with a least depth of 5 fathoms, is 300 yards wide between the Basse du Chenal, a small rock with only 5 feet at the lowest tides, and a rock forming the southwestern extreme of the Rondes de la Dechiree, which uncovers 4 feet. The leading mark in is Chausey Lighthouse in line with Gros-Mont semaphore 129°, and when the Pointue Rock appears midway between the Dechiree and Grande Entree Rocks the vessel is in the middle of the anchorage.

There is another anchorage, with from 2½ to 5 fathoms, called the Dechiree, eastward of that just described; it is entirely surrounded by high rocks, which cover at the last quarter flood, forming between half ebb and half flood a natural harbor, accessible at all tides, but no vessel should use it in changeable, boisterous weather or without a good local pilot; it is not more than ½ mile in length and 500 yards in width, the broadest part being between the Dechiree and a rock to the southward, which uncovers 25 feet.

To enter this anchorage proceed as before, with the lighthouse in line with the semaphore, and when the Pointue is half its apparent breadth open southward of the Dechiree, the vessel is southward of the Rondes de la Dechiree and should haul to the eastward, taking care to avoid two rocky patches awash at low water springs on the southern side of the anchorage. When the lighthouse is in line with Massue Rock, 139°, anchor in from 4 to 5½ fathoms water, with rather coarse ground. With the aid of a good pilot the Enseigne anchorage and the northern channel into Chausey Sound are often entered by this route within 2 hours before or after high water.

Beauchamp Anchorage is 500 yards northwestward of the Huguenans, and, with a good pilot, might afford shelter to one or two vessels of deep draft. The principal entrance has a least depth at low water of 4 fathoms, and therefore has nearly 10 fathoms at high water springs and 8½ fathoms at neaps. The anchorage consists of a kind of basin or deep about 800 yards long 6° and 186° and 300 yards wide; it has a depth of from 5 to 6 fathoms at low water springs, with excellent holding ground between the lines of the lighthouse on with the southern extreme of the Ango Rock and of Gros-Mont Semaphore on with the northern hillock of Grande Ancre or Saddle Island. It is tolerably well protected throughout the tide at neaps, but at high water springs fresh winds from northwest to northeast cause a heavy tumbling sea, which, however, soon subsides as the tide falls.

Vessels usually moor north-northeast and south-southwest (mag.), but, if intending to remain, they should be secured with anchors on each bow and quarter. Two sets of moorings with mooring buoys for the use of the small French steamers employed in protecting the oyster fishery occupy the central part of the anchorage.

Southern entrances.—A vessel of considerable draft, with a fair wind and an experienced pilot may enter the Beauchamp Anchorage from the southward at all times by passing between the Grand Piliers and Tournioure Rocks; the latter has on it a beacon, which, however, is sometimes washed away and should not be depended on, or between the Tournioure and Chapelle Rocks, but these narrow passages can not be used at all times without steam or a sufficiently commanding breeze to stem the tidal streams.

The leading mark to pass between the Tournioure and Piliers is the summit of Roche Noire in line with the Culassiere Rock 4°. Great care is required in passing the Tournioure at half flood, the stream immediately outside it setting strongly to the eastward, while between it and the Piliers it takes the direction of the channel. Having passed the Tournioure Beacon, steer northeastward toward the Petit Huguenan to get into the fairway and then more northerly to pass midway between that islet and Roche Noire, after which the summit of the Rock Caniard du Sud, open westward of the Culassiere 357°, leads to the anchorage.

The entrance eastward of the Tournioure is the deepest, but is only 50 to 60 yards wide, between the Tournioure and Chapelle Rocks, and should never be attempted during the strength of the tide; the best time is within an hour of high water, and the nearer high water the better. A vessel having passed midway between the Tournioure and Chapelle Rocks and also between Roche Noire and Petit Huguenan may proceed to Beauchamp Anchorage as before directed.

Passe de la Conchee, with a sufficient rise of tide, is the safest entrance to Beauchamp Anchorage from the southward for vessels of light draft; it lies between the Iles des Huguenans and Conchee Rocks, and from thence northwestward between two mud banks. which dry from 3 to 7 feet. The entrance is between the Gaillard d'Avant Rock, which uncovers 29 feet, and has just northward of it the Artimon Rock, which uncovers 19 feet, and some small heads close southwestward of the Conchee, which uncover from 9 to 17 feet. The leading mark is the Selliere and Petite Mauvaise Rocks in line 319° until the lighthouse comes on with the middle of the Ango Rock, then haul to the westward for the anchorage and cross the mud bank extending northward from the Huguenans.

When the small heads close southwestward of the Conchee are covered and the Artimon Rock is awash, there is not less than 13 feet on any part of the mud bank which must be crossed in running for the anchorage.

Passe Orientale de l'Etat.—The Beauchamp Anchorage may also be reached from the northeastward through this passage, which is a clear space through the rocks in the northeastern part of the Chausey Group; the tide, however, must be sufficiently high for a vessel to cross the sand bank, which extends over the greater part of the passage and dries from 2 to 5 feet above the level of the lowest tides.

The entrance to this passage, 300 yards wide, is between the Pouillou Rock, which uncovers 32 feet, and some small rocky heads connected with the Petit Etat, which uncover from 4 to 10 feet. From thence the passage is bounded on the western side by the Caniard du Sud, which uncovers 38 feet, and by the Mauvaise, always above water; and on the eastern side by the Plate du Hibou, a small rocky group of which the highest head uncovers 27 feet, and by the Culassiere Rock, which is never covered. The leading mark is Petite Ancre Islet in line with the Mauvaise 215° until within about 300 yards of the latter, then steer southward to pass between it and the Culassiere, and from thence to the anchorage.

There are several other entrances to the Beauchamp Anchorage on the northern and western sides of the group, of which two admit vessels up to 10 feet draft at low water, but all are so intricate as to be of use only to fishermen and coasters thoroughly acquainted with the localities.

Tides.—It is high water, full and change, at the Chausey Group at 6h. 14m.; equinoctial springs rise 46 feet, ordinary springs 35 feet, and neaps 26 feet above the zero of soundings; neap range 17 feet. The stream turns at the eastern end of the group, between Founet and Pignon Rocks, from 25 to 30 minutes earlier than in the middle of the passage between the Founet and pointe du Roc, Granville; that is to say, the flood or northern stream begins to be felt about 4½ hours before high water at Granville, and the southern stream one hour after.

Admiralty Bank.—This narrow ridge of sand, lying between the Chausey Isles and the mainland is not more than 400 yards wide and extends 1.3 miles 18° and 198° with only 7 feet water on the shoalest part close to its northern end; from this extreme Granville Lighthouse bears 139° 4.3 miles; Coutances Cathedral is seen midway between the church and mill of Mont Martin 43°; Conchee Rock is in line with the eastern ile des Huguenans, and the Etat Beacon turret shows just northward of the Canue Rock 293°.

Coutances Cathedral in line with Mont Martin Church leads eastward of this bank; the Etat twice its own breadth open northward of the Canue, or Mont St. Michel twice its own breath open westward of Champeaux Point 158°, leads northeastward.

Dangers off Granville.—The navigation between Granville and the Chausey Isles at low water springs is rendered both difficult and dangerous for vessels drawing more than 7 or 8 feet by the numerous banks and knolls of sand, which form a bar having only from 14 to 17 feet water on the deepest parts, and with several patches of from 2 to 6 feet; small coasters, however, by following the directions given for this passage, may pass between these banks and the Admiralty Bank in not less than 10 feet at low water.

Tombelaine Bank.—The flats extending from 1.3 miles 265° of Pointe du Roc to Champeaux Point, on which there is from 1 to 6 feet water, extend nearly 3.5 miles from the shore westward of St. Pair; they then gradually narrow until nearly abreast of Champeaux Point, where the bank, marked on its western side by two black buoys, again projects seaward in a long narrow spit having 9 feet at its outer end, which bears 296° 4.3 miles from Champeaux Point. The highest of these flats are the Tombelaine Bank, awash at low water springs, and another little ridge of sand which uncovers 1 foot. The northern part of this latter lies 206° about 2.5 miles, and the highest part of the Tombelaine 215° 1.3 miles from Granville pierhead light.

Basse Dorriere is a small isolated rock rising from a sandy bottom, with only 4 feet water; it lies 600 yards northward of the northern end of the Tombelaine Bank, with Granville Lighthouse bearing 57° 1.3 miles; and the west pierhead light 71° 1.3 miles.

The Haguet Bank consists of a number of shoal heads with from 2 to 6 feet on them and from 9 to 15 feet between. It extends 2.8 miles in a 333° and 153° direction, and the northern head with 6 feet bears 299° 3.8 miles from Granville Lighthouse.

Between this head and the southern end of the Admiralty Bank there is a passage about 500 yards wide with 11 feet water. Chausey Lighthouse touching Chapelle Rock, 269°, is the leading mark through. The southern end of Haguet Bank is nearly joined to the Tombelaine Bank by a narrow ridge of sand which almost dries at low water, springs, thus forming at that time the shallow bar between Granville and the Chausey Isles before mentioned.

Banc de Rondehaie, a small patch of sand, gravel, and rock, with 10 feet water, bear 237° 4.5 miles from Granville Lighthouse. The spire of Granville Church open northward of the lighthouse leads nearly a mile northward of the bank; the Culassiere Rock, Chausey, in line with the Huguenans Beacon turret, north, leads westward; and Culassiere Rock midway between the Huguenans and the Conchee, 333°, leads eastward.

There is a small knoll with 23 feet water 321° about 600 yards from the Rondehaie.

Buoy.—Upon the northeastern edge of Rondehaie a black buoy (marked R) is moored which also denotes the northwest limit of the oyster beds, extending hence about 6 miles to the southward.

The Videcoq—Bell buoy.—This small rock uncovers 2½ feet, and has from 18 to 20 feet, sandy bottom, on all sides. It is marked on its eastern side by a bell buoy painted with red and black bands. The rock lies westward of the Haguet Bank, with Granville Lighthouse bearing 82° 3.3 miles; Chausey Lighthouse 298° 5.5 miles; Granville Church is in line with the second southernmost chimney of the southwestern barrack; and the Culassiere Rock is nearly on with the Conchee Rock.

Granville Church on with the northernmost chimney of the southwestern barrack leads ½ mile northward of the Videcoq Rock; the same church in line with the southern chimney leads 500 yards southward; the Mauvaise Rock in line with Conchee leads ½ mile eastward; and the Mauvaise on with the Huguenans leads westward.

A sand bank about 1,600 yards long northwest and southeast and 500 yards wide, with only 6 feet water, lies ½ mile northward of the Videcoq. The Mauvaise Rock midway between the Huguenans and Conchee leads westward of it; and the three mills of Breville a little open northward of the foot of Menars Point leads northward.

Basse Parisienne is a small rocky ridge, steep-to, with 13 feet water over it and depths of 6 or 7 fathoms on all sides; from it Granville Lighthouse bears 67°, 5.8 miles; Chausey Lighthouse 326°, 5.5 miles; and Pierre de Herpin Lighthouse 213°, nearly 5 miles. The marks for it are Haut-Bout eastern mill, well open westward of the Herpin Rock 216°, and Granville Lighthouse, between the steeple of Granville Church and the barracks. These barracks are high and, standing on the top of the precipice of Roc de Granville, northwestward of the steeple, are very conspicuous.

The Petits Bancs are six or seven small sandy ridges, with from 6 to 9 fathoms on them, 186°, 3.5 miles from Chausey Lighthouse; they occupy a space 1.3 miles long northwest and southeast and ½ mile wide. They are not dangerous, but when it blows hard should be avoided by small vessels, as they cause a heavy sea.

Granville.—The port of Granville is between Pointe du Roc and Gautier Point, which latter bears about 96° 1,800 yards from the southwestern extreme of Roc Point. Gautier Point is high, and on its summit is a fort which commands the entrance to Granville Harbor. The town of Granville is built in the form of an amphitheater at the foot of the eastern part of the high, narrow, steep peninsula of Le Roc, which is nearly a mile long 243° and 63° 300 yards wide, and united with the mainland by a narrow isthmus ½ mile northward of Gautier Point. The upper town is surrounded by walls and occupies the eastern part of the peninsula; the lower town stands on the isthmus at the entrance of a narrow valley inclosed between high hills, and waters by the little River Bosc, which separates the suburbs from the lower town, its waters, when swollen by rains, running over the sands westward.

The outer harbor is on the western side of the lower town at the foot of Le Roc, which, with the adjacent land, shelters it from winds from NW. by W. round by north and east to SE. by S., and the pier protects it from the heavy sea caused by southwesterly winds, but it is open from S. by E. to SE. by S. The water is smooth in the harbor when it blows hard from north to northwest, but vessels should then be well moored to resist the violent squalls which rush down from Le Roc. The pier is built on the rocks which uncover at the foot of the southwestern part of Le Roc. It begins at 65 yards westward of the last houses in the lower town, and from thence extends in a southerly direction about 390 yards; it then turns eastward for about 210 yards and is terminated by a broad pierhead. The eastern pier approaches the western pier from the northeastward, leaving a passage about 142 yards wide between the pierheads.

Depths.—The bottom between the pierheads is of hard sand and gravel and dries 10 feet above the level of the lowest tides; here there is a depth of 27 feet at high water springs and upward of 17 feet at neaps. Inside it dries 19 feet, but the bottom is of soft mud and affords good berths for the crowds of fishing craft, by which it is usually occupied.

This harbor can be entered by the vessels which usually frequent it at ordinary neaps from 1½ hours before to 1½ hours after high water.

The inner harbor is a wet dock or basin, having its entrance from the eastern side of the outer harbor by means of a lock 246 feet in length and 54 feet wide; its outer sill has 30 feet and its inner sill 24 feet over it at high water, ordinary springs; at this time the depths in the basin are from 18 to 23 feet. Another small basin lies on the eastern side of the main basin and communicates with it by means of an opening, without gates, 65 feet wide, the sill being 7½ feet above the dock sill. Vessels of 14 feet draft are neaped in this inner basin during several tides, and it can only be entered from 1 to 1½ hours before or after high water, according to the height of the tide.

Graving dock.—At the northwest part of the outer harbor of Granville there is a dry dock 216 feet in length, 183 feet on blocks; breadth at entrance, 47 feet; depth on sill at high water, ordinary springs, 22¾ feet.

Gridiron.—Close to the graving dock there is a gridiron, 101 feet in length and 27 feet in width, upon which the depth is 16¾ feet at high-water springs.

There is also at this port a heaving-down slip 98 feet long and 13 feet wide.

Communication, etc.—Granville is in direct railway communication with Paris, the distance occupying about 8 hours; the steamers of the London & South Western Railway Co. also ply regularly between it and Jersey, thus connecting it with England. It has a considerable trade, but one of its principal industries, the oyster fishery, has entirely failed of late years.

The rocky bed forming the base of the western part of Le Roc uncovers 700 yards in a southerly direction from Pointe du Roc, and 400 yards north by west and northwest by west from the northwestern part of the peninsula, which latter part is marked by a beacon surmounted by a globe, the upper part of the beacon white, the lower part black.

Loup Rock—Beacon turret.—This rock, the nearest danger to the harbor, is marked by a beacon turret painted with red and white bands. It lies 184° 550 yards from the extreme of the western pier, and uncovers 21 feet; it forms a natural breakwater during southwesterly gales. The west pierhead lighthouse on with the gap which separates Le Roc from the hills northwestward of it, leads 200 yards westward of the Loup, and the same lighthouse in line with Granville Church steeple leads 100 yards eastward. The rock covers at half flood, at which time there is a depth of 10 feet between the pierheads and 16½ feet over the Tombelaine Bank.

A tide scale, marking the height of water above the floor of the lock between the outer harbor and the wet basin, is graduated upon the Loup Beacon turret.

Lights.—Granville Lighthouse, a circular tower 43 feet high, stands on Pointe du Roc, or Cape Lihou, and exhibits, at an elevation of 154 feet above high water, a group-flashing white light, visible 18 miles. From it Chausey Lighthouse bears 285° 8.5 miles; Pierre de Herpin Lighthouse, 231° 10.3 miles; and Senequet Rock Lighthouse, 352° 15.5 miles.

Fog signal.—During thick or foggy weather at Pointe du Roc a trumpet is sounded.

West pierhead.—A fixed red light is exhibited from a circular turret 34 feet in height on the southeast extremity of the molehead on the western side of the entrance to the harbor. The light is elevated 39 feet above high water and is visible 3 miles.

East pierhead.—A fixed green light, visible 3 miles, is shown from a steel column on the eastern pierhead at an elevation of 25 feet above high water.

Semaphore.—There is a semaphore station close to the lighthouse on Pointe du Roc.

Tides.—It is high water, full and change, at Granville at 6h. 9m. Ordinary springs rise 37 feet and neaps 27½ feet above the soundings; neaps range 17½ feet. Equinoctial springs rise 7 feet higher than ordinary springs.

Pilots.—Granville pilots cruise in the vicinity of the Iles Chausey in decked two-masted boats. Vessels approaching Granville from the westward, however, during strong westerly winds, do well to haul up under the lee of Grouin Point to secure a pilot, as at such times boats may not be able to keep the sea off Granville. Pilots take charge of vessels leaving Granville as far westward as Cape Frehel or as far northward in the Cotentin Channel as the Bancs Feles.

A lifeboat is stationed at Granville.

Directions — Entering Granville. — Bring the west pierhead lighthouse open of the fall of the land under the eastern end of Garrison Bluff, to pass between the tail of the Loup and the rocks on which the pier is built; or, if wishing to pass eastward of the Loup Rock, open Granville Church its own breadth eastward of the lighthouse. Give the pierhead, when rounding it, a berth of a ship's length only, shoot as far to the westward as possible when within it, and drop the anchor when convenient. A vessel drawing 10 feet must not attempt to round the pierhead until 4 hours flood, especially if there be any sea.

All possible sail should be carried when entering the harbor, and in the event of a sudden shift of wind, a vessel should be prepared either to anchor or to run out a hawser to the warping buoy between the Loup Rock and the Plateau Jean-la-Blanche. When it blows hard between northwest by west and southwest by south, the great inequalities of the rock ridge extending southward from Granville Lighthouse occasion a heavy sea outside the mouth of the harbor, and the outer part of this ridge, which uncovers 9 feet at the lowest tides, is then very dangerous; there is also a heavy breaking sea in the passage between the pier and the Loup with strong winds between northwest by west and west by south. This dangerous part is avoided by keeping St. Nicholas Church steeple on with the southern slope of Gautier Point.

Should the wind be light, endeavor to maintain a position off the harbor, so as to be carried toward the cntrance from 1½ hours before to half an hour after high water, while the stream is running 74° and 51°; but do not attempt to enter before high water or the vessel may be carried westward of the pier, and even on Pointe du Roc, by the eddy on the flood, which leaves the harbor after traversing the quays from east to west, and runs along the shore toward Pointe du Roc. The strength of this eddy is from 1 to 1½ knots at springs; it runs from half flood to high water, and it is in order to stem it that plenty of sail should be carried when entering the harbor.

When arriving off the harbor before there is sufficient water to enter, if the wind is strong enough to stem the tide, keep southward of the line of St. Nicholas Church steeple on with the southern slope of Gautier Point. With the wind from northeast by north round by north to west by north, keep northward of this line and make short tacks southward of the Chausey Islets between Chausey Lighthouse and the Conchee; and with the wind from west by north round by west to south, short boards should be made between Grouin Point and the Basse Parisienne, not standing southward of an imaginary line drawn from Pierre de Herpin Lighthouse to Champeaux Point. As soon as there is water sufficient to enter the harbor, steer for it, keeping the West Pierhead Lighthouse on with the gap which separates Le Roc Peninsula from the hills northeastward of the town; this leads a cable westward of the Loup and to the entrance of the harbor.

In working toward the harbor from the southwestward make a long board to the northward of the line of St. Nicholas Church steeple on with the southern slope of Gautier Point, but avoid being carried too far northward by the flood stream. The last board should be made southeastward of the Loup, taking care to avoid the Norocher, a ridge of rocks of which parts uncover from 10 to 12 feet. From thence stand for the harbor eastward of the Loup, on which side that rock may be approached to within 100 yards without danger.

At low-water neaps small coasters arriving off the harbor with the wind offshore may anchor to await tide between the Loup Rock and Tombelaine Bank, where they will then find 10 or 12 feet water over a bottom of sand and broken shells; at low-water springs there is but but 2 or 3 feet water here. There are also a few rocks in the eastern part of the anchorage, but with Mont St. Michel open of Champeaux Point, a vessel is 400 yards westward of them.

Leaving Granville, a sailing vessel of deep draft should wait for a leading wind, and, if bound westward, advantage should be taken of offshore winds, particularly those between east and south. If the wind is between east by south and southeast by south and strong enough for vessels to stem the tide, leave as soon as the ship floats and steer to pass 2 or 3 miles northward of Cezembre Island and of Cape Frehel. If between south by east and southwest by west, haul out to the warping buoys as soon as she is afloat and make sail from the outer buoy. Short boards must be made as far as Thar Point, 2.5 miles southward of the harbor, and from thence they may be lengthened, coasting at a safe distance from the inshore dangers as far as Cape Frehel to avoid being carried by the tides toward the Minquiers and other off-lying dangers. In fine weather the Minquiers light buoys, together with the lights of Chausey, Granville, Pierre de Herpin, St. Malo, and Cape Frehel render this navigation as easy by night as by day.

The coast.—From Pointe de Roc, Granville, Cape de Carteret, which is the western extreme of the first high land on the coast northward of Granville, bears 347° 33 miles, the whole of the coast line between the two points being low and receding slightly eastward. Six small harbors, capable of affording shelter to coasters of 40 or 50 tons, are within this space, viz, Regneville, Geffosse, St. Germain-sur-Ay, Surville, Port Bail, and Havre de Carteret, just eastward of the cape of that name.

For the first 16 miles northward of Granville the sandy beach bordering the coast dries in places at low water as much as 2.5 miles from the shore; northward of Geffosse it uncovers on an average about 1 mile, and throughout the whole extent of this tidal sea board numerous reefs of rocks are scattered in all directions, rendering the approach to it exceedingly dangerous.

The off-lying reefs and shoals between the coast and the Channel islands are also very numerous, causing the navigation between Granville and Cape de la Hague by this route, known as the Cotentin Channel, to be both intricate and dangerous, the latter especially if surprised by foggy weather, though it is well lighted and buoyed.

Coutances Cathedral, about 6 miles inland and 14 miles 29° from Pointe du Roc, may be known by its two spires or turrets; it is lofty and a useful landmark. The church steeple of Agon, 1 mile inland, is a large square tower covered with tiles, and the little church steeple of Pirou 8 miles further northward very much resembles it. From Coutances toward Granville, the interior of the country presents a moderately high but regular outline which terminates at Champeaux Point, the bluff and nearly perpendicular headland 5.8 miles southward of Granville. From Coutances northward the character of the country alters, the interior being high though somewhat irregular, and between St. Germain and Barneville, 2 miles eastward of Cape de Carteret, the inequalities become very marked and conspicuous.

The entrance to Regneville is 10 miles 9° from Granville Lighthouse. The coast between it and St. Germain trends 355° for 13 miles, and the shore is low, sandy, and bordered with downs. Among the most remarkable objects is Mont Huchon, nearly 2 miles northward of Coutances Cathedral, and 6 miles inland east-northeastward of the entrance to Regneville Harbor, and of the western part of the line of hills immediately northward of the harbor, on which stands the village and church of Agon. This part of the hills ends abruptly with steep slopes toward the sea, and when seen from the northwestward at a distance, presents the appearance of a high cape facing westward.

The most conspicuous objects on the land between St. Germain and Cape de Carteret are Monts Gardon and Doville, and the hills of Benneville; on the first stands the village of Mont Gardon and two mills, 3.5 miles from the sea and 3 miles northeastward from the town of St. Germain; Mont Doville, 2.5 miles northward of Mont Gardon and 6.5 miles 91° of the entrance to Port Bail, has a windmill on its summit; and Benneville hills rise 51° 4 miles from Port Bail and have three windmills on them.

Catheue Banks, including Catheue Reef and Shamrock Knoll, extend north and south 6 miles and lie nearly parallel with the line of coast; they are chiefly composed of sand. Two patches near their middle dry at very low tides, at which time there is 6 feet at their southern end and 2 fathoms at their northern end. These banks are almost connected with the shore on their eastern side, and, southward, with the shoal extending from Pointe du Roc, from which point their northern extreme is distant 11 miles.

Catheue Reef—Bell buoy.—This dangerous ledge is about a mile long 230° and 50° and 500 yards wide, lying between the northern end of the Catheue Banks proper and the Shamrock Knoll. It has several rocky heads, of which two uncover at the lowest tides, when the rest have from 3 to 6 feet over them. The highest head uncovers 2½ feet near the middle of the reef, and is marked by a black bell buoy moored southeastward of it.

This head lies 226° 2.8 miles from the westernmost head of the Ronquet Reef, 336° 8.5 miles from Granville Lighthouse, and 40° 7.3 miles from Chausey Lighthouse. The marks for it are Mont St. Michel thrice its width open westward of Champeaux Point, Chausey Lighthouse on with the southern side of the Etat Rock, and Coutances Cathedral in line with Agon Point 63°.

Champeaux Point just open of Pointe du Roc, 161°, leads eastward of Catheue Banks and Reef; and Agon Church steeple in line with the southern slope of Mont Huchon, 71°, leads a safe distance northward of that reef and of the Shamrock Knoll.

Shamrock Knoll is a sandy ridge at the northern end of the Catheue Banks 1 mile long 355° and 175° and 400 yards wide, with 3 feet on the shoalest part at its southern end and 2 fathoms at its northern end. The southern end is only about 1,400 yards northwestward of the western end of the Catheue Reef and between them is a patch of 6 feet. More than ½ mile northwestward of the knoll are several 2-fathom patches.

Roches d'Agon are a small group 3.3 miles from the shore, halfway between it and the northern extreme of the Shamrock Knoll and 1.5 miles northwestward of the Ronquet Beacon turret, with from 8 to 10 feet water close to them. They form, in conjunction with a bed of rocks on the beach, a continuous ridge extending westward from the direction of Agon steeple and parallel with the Ronquet and Moulieres d'Agon Rocks. The highest head of the Roches d'Agon uncovers 8 feet; 230° 900 yards from it another head uncovers 6 feet and 500 yards westward of the latter another uncovers 2 feet; this head lies 293° 1.5 miles from the Ronquet Beacon turret and south rather more than 3 miles from the westernmost head of the Nattes.

There are no marks available for the western head of the Roches d'Agon, which are extremely dangerous to approach between half ebb and half flood, and a heavy sea runs on them when it blows hard from the westward, but Hatainville Sand Hills shut in by Cape de Carteret 350° or Champeaux Point just in sight westward of Pointe du Roc leads 1 mile westward of the outer rock.

Ronquet Rock—Beacon turret.—This rock lies 265° 2.3 miles from Agon Point Lighthouse at the entrance of Regneville Harbor, and is the highest rock of a group a mile long, east and west, and ½ mile wide. A black beacon turret stands on its summit; the rock uncovers 20 feet and it affords useful tidal information to the mariner, for when it covers, at about half flood, the stream in the offing turns to the northeast and at half ebb, when it is awash, the stream turns and sets to the southwest.

The next highest head, at the southern part of the group, uncovers 12 feet 170° ½ mile from the Ronquet Beacon Turret, with Grimouville Church steeple a little open northward of Coutances Cathedral 68°, and Mont Martin windmill in line with the guardhouse at the southeastern point of entrance to Regneville Harbor 96°. The latter mark also shows the direction of the western point of the group, which is 1,500 yards westward of the Ronquet and is terminated by a rock uncovering 5 feet.

The Basse Quesnel, a rock head, with less than 6 feet over it at L. W. E. S., lies nearly ½ mile off the southwestern end of the group and is apparently a continuation of the reef.

Agon Point Lighthouse in transit with Regueville Church clears it to the southward.

Champeaux Point just open westward of Pointe du Roc leads well westward of it.

Regneville is at the mouth of the little River Sienne, into which the River Soulles flows 4 miles in the interior; the harbor is so choked with sand as to be practically dry at high-water neaps and to admit coasters only of about 8 or 9 feet draft at high-water springs. The bottom, being chiefly sand and shells, is bad holding ground; the anchors should therefore be buried to avoid driving with strong winds between 276° and 209°, to which the entrance is exposed.

The entrance is between the Bec d'Agon, or Agon Point, and the point on which the guardhouse stands, which, in line with Mont Martin windmill, is the mark for the southwestern extreme of the Ronquet Group; several sand banks lie in the fairway, and the action of the tides causes Agon Point to grow constantly southward, the lighthouse originally built near the extreme being now more than 600 yards from it. Two channels, marked by beacons and buoys, lead to the entrance, but both are very subject to change, and neither should be attempted without a local pilot. The deepest channel borders the southern side of the Ronquet Group and the Moulieres d'Agon; the leading mark for it is the fort 600 yards northwestward of the extreme of Agon Point seen between the steeples of Coutances and Grimouville about 66°.

The other channel, named the Coliere, is not quite so deep, but has the advantage of leading directly into the harbor and avoiding the turn southeastward in rounding Agon Point. The Caillou Rock, which uncovers 17 feet, lies on the eastern side of this channel. The leading mark is Grimouville church steeple, a little open eastward of the customhouse, the last large house on the shore at the northern part of Regneville village.

Light.—A fixed white light is exhibited from a square tower with building, 23 feet high on Agon Point, at an elevation of 33 feet above high water, and is visible 10 miles.

Tides.—It is high water, full and change, at Regneville at 6h. 20m.; springs rise 35 feet, neaps 26 feet above the soundings.

Nattes Rocks—Bell buoy.—The Nattes Rocks are a small rocky group about 400 yards long northwest and southeast at the southwestern extreme of the ridge extending from the Senequet, and north 3 miles from the western edge of the Roches d'Agon. They are the most western inshore rocks which uncover between the harbors of Regneville and St. Germain. A black bell buoy, with staff and reflector, is moored off their western side. The Nattes Rocks lie 257° 3.5 miles from the entrance of Blainville Harbor; 290° 2.3 miles from Senequet Lighthouse; and the marks for the highest head, which uncovers 3 feet only, are Senequet Lighthouse, a little open westward of Pirou church steeple; and Coutances steeples in line with the houses of Courtainville, a village built on a remarkable mound, 96°.

Champeaux Point, just showing westward of Pointe du Roc, or Pirou steeple well open westward of Senequet Lighthouse, leads outside the Nattes. Their western extreme, in 6 feet, bears 347° 14 miles from Granville Lighthouse, and is exactly in line between it and Cape de Carteret Lighthouse, being distant from the latter 19.5 miles.

Several small ridges of rock uncover from 3 to 5 feet at low-water springs, and form a chain a mile in length, which extends from the Nattes northeastward and joins the outer sunken rocks of the Senequet Ridge. A heavy sea runs on all these rocks when it blows hard from the westward.

International buoy.—At 4 miles 212° from the Senequet Rock Lighthouse and 1.5 miles from the Nattes Rocks is the International Buoy F, painted with red and black horizontal stripes.

Blainville Harbor, nearly midway between Regneville and Geffosse Harbors, is a kind of lagoon almost filled with sand and affording shelter to fishing boats at springs only.

A buoy painted with red and black bands and another buoy painted black mark the entrance, and there is also near it a red beacon consisting of a mast surmounted by a ball.

A lifeboat is stationed at Blainville.

The Senequet Rock.—This rock, on which stands a lighthouse, almost forms a connecting link with the line of dangers extending from La Roque Point, Jersey. It is 2 miles from the shore, 2.5 miles northwest from the entrance to Blainville, and uncovers 27½ feet. It is the highest head of the rocky ridge which extends eastward from it to the shore, southeastward to the Klebet Rocks, southwestward as far as the Nattes Rocks, and northwestward 1,600 yards, where a black floating beacon is moored. This outer part is very dangerous, as it greatly contracts the passage between the Senequet Rock and the Bœuf. The outer head is awash at the lowest tides, with Senequet Lighthouse just open southward of Blainville Church steeple 116°. The space for more than 2 miles between this head and the Nattes is equally dangerous, being one continued chain of rocks, of which the highest uncover from 6 to 8 feet. When it blows hard from any direction between north and south round by west there is a heavy sea on them. Mont Gardon Church steeple, between the summit of Mont Doville and St. Germain Church steeple, leads a safe distance outside both the Nattes and the outer rocks of the Senequet.

Light.—The Senequet Rock Lighthouse is a white circular stone tower 75 feet high, from which at an elevation of 56 feet above high water is exhibited a group occulting light with a red sector. It is visible 13 miles. From it Granville Lighthouse bears 172° 15.5

miles, Chausey Lighthouse 203° 14.8 miles, and Cape de Carteret Lighthouse 341° nearly 18 miles.

Basse le Marie, a rocky ledge nearly 800 yards long east and west and 400 yards wide, lies nearly midway between Shamrock Knoll, the northern extreme of the Catheue Banks, and the southeasternmost patch of the Southern Anquettes, distant about 3 miles from both. Its highest head, at the eastern end of the ledge, uncovers 4½ feet at the lowest tides; near the middle another head is awash, and at the western extreme another has 15 feet over it at the same time. The ledge has depths of from 4 to 7 fathoms round it, with sandy bottom mixed with pieces of shell. From the highest head the western edge of the Nattes Rocks bears 68° 4.5 miles; the Bœuf Rock beacon turret 6° 4.7 miles; and the highest head of Catheue Reef 153° 5.5 miles. Coutances cathedral is its own breadth open southward of Agon church; and Rozel manor house, Jersey, is in line with Archirondel tower 321°.

A shoal patch, about 150 yards in extent, with a least depth of 19 feet at lowest spring tides, lies about 1.3 miles 338° of Basse le Marie.

Coutances cathedral its own breadth open northward of Agon church tower leads northward of the ledge but close to it; Mont Martin Church and mill in line 99° leads southward; the Etat and Huguenans Beacon turrets, Chausey, in line 175°, lead between it and the Catheue; and the Etat on which the Conchee, south, leads westward of it, as does also Hamon Rock exactly in line with the western apex of Grande Ancre Islet.

International buoy.—A red buoy, marked with the letter E and surmounted by a triangle, is moored eastward of Basse le Marie. This buoy, as also the buoy F, serve to mark the limits of the French oyster fisheries.

Chaussee des Bœufs are ledges of dangerous rocks 2.5 miles long east and west and 1 mile wide. Their outer edge is 4.3 miles southeastward of the Grande Anquette Beacon turret, 6 miles from high-water mark on the French shore, and they appear above water at 4 hours ebb, some heads showing only at low water and many more being always covered. In the vicinity of these rocks the ground is very foul, and dangers are scattered in all directions, principally, however, northward, westward, and eastward of them; among the rocks are depths of from 4 to 7 fathoms.

The Bœuf Rock—Beacon turret.—This, the highest rock of the group, is about one-third from the eastern end of the Chaussee, and is marked by a beacon turret painted with red and white bands, 10 feet above high water, and surmounted by a short mast and globe. The marks for this rock, which uncovers 18 feet at the lowest tides, are Seymour Tower, Jersey, touching the southern side of the Grande Anquette Rock, 288°, and Hatainville sandhills, seen between Capes de Carteret and Flamanville. The Bœuf Rock is surrounded for the space of 800 yards by small rocky heads which uncover 4 or 5 feet. The Bœuftins, ½ mile westward of the Bœuf and nearly a mile within the western edge of the reef, are small detached ridges, of which the highest uncovers 9 feet.

A floating beacon is moored about 800 yards eastward of Bœuf Rock beacon turret.

Basse Occidental des Bœufs, ½ mile northwestward of the Chaussee-des-Bœufs, is a very small detached rock with only 4 feet water; it bears about 276° 1 mile from the northern rock of the Bœuftins which dries 7 feet. From the Basse, Prince's Tower, Jersey, appears a little open northward of the Grande Anquette 302°; Coupe turret, in line with St. Catherine's Breakwater Lighthouse, bears 316°; and the steeple of Coutances Cathedral is just open northward of Blainville church steeple.

Basse Nord-Ouest des Bœufs is a small ridge of rocks 600 yards long east and west, rising from rocky, shallow ground 1 mile in extent, and united to the Chaussee-des-Bœufs by a rocky bed, on which the depths are from 4 to 5 fathoms. The highest head of this ridge uncovers 2 feet; from it Seymour Tower, a little open southward of the South Hill, Jersey, bears 285°; and the Bœuf beacon turret, distant nearly 2 miles and appearing between the church steeples of Mont Martin and Agan, 122°.

Basse Jourdan—Bell buoy.—This small rocky ridge, 200 yards in extent with only 2 feet water, lies 87° 1.8 miles from the Bœuf beacon turret, but only 1,800 yards from the eastern head of the Chaussee-des-Bœufs, which is nearly awash at low water, and 293° 3.3 miles from Senequet Lighthouse. A red and black bell buoy, with staff and reflector, is moored close to its eastern side. The marks for the shoalest part are Blainville church, in line with the northern sandy point of Blainville Harbor, or with the southern side of the Senequet Rock; Gouville church, open northward of Mont Huchon 98°, and Cape de Carteret on with the highest of the Hatainville sandhills.

Bœuf Patch, 1.5 miles northward of the Basse Jourdan, is 1.5 miles long, 338° and 158°, and its greatest width near the northern end is about 800 yards. It has a general depth of 3 fathoms, with 2½ fathoms near the northern end. The marks for the shoalest part are Vesley church, touching the extreme of the western point of entrance to St. Germain 60°; Coutances Cathedral, just open northward of Linverville church 118°; and Agon church, just open eastward of Senequet Lighthouse 132°.

There is a 5-fathom channel 1 mile wide between the Bœuf Patch and the Chaussee-des-Bœufs, for which the leading mark is Bergerie House, just northward of Noirmont Point, Jersey, in line with Seymour Tower 279°, or Blainville church four times its width open northward of the Senequet Rock Lighthouse; but care is required in this passage, as both ebb and flood act upon the vessel's beam.

Clearing marks.—Hatainville sand hills, shut in by Cape de Carteret 350°, leads eastward of Basse Jourdan and of the Bœuf Patch. Coutances Cathedral, twice its own breadth, open southward of Blainville Church steeple, leads 400 yards clear of the southwestern extreme of the Chaussee-des-Bœufs; Prince's Tower, open westward of Grande Anquette Beacon turret 303°, leads westward of them; and Grande Anquette and Icho Towers, in line 276°, lead 600 yards northward of the 2-foot rock on the Basse Nord-Ouest des Bœufs.

Prince's Tower, open 3° southward of Mont Orgueil Castle, clears the northern end of the Bœuf Patch; Icho Tower, its breadth open northward of Grande Anquette, clears the southern end; and the Bœuf Beacon turret 178° clears the western side.

Directions.—Vessels navigating in the northern vicinity of the Chaussee-des-Bœufs between half ebb and half flood, the most dangerous time, must be careful to keep Bergerie House open northward of Seymour Tower and Bouley Signal Station 3° open northward of Rozel Mill, a building without sweeps, with a white-dome roof, and the main part of a dull reddish color. The signal station will be also just open of Rozel Manor House.

Southward of the Anquettes and the Bœufs for a long distance the sea is much encumbered by sunken rocks and banks of sand and gravel having depths of from 3¼ to 6 fathoms over them; indeed, from the southern Anquettes, in the direction of Basse le Marie and the Iles Chausey, scarcely a spot is quite free from one or the other, and in boisterous weather the whole of that space is one continuous sheet of broken water. The proper channels, lying eastward and westward of this accumulation of shoal ground, are pretty clear.

The Chaussee-des-Bœufs and Anquettes, being so beset on all sides by danger, the utmost caution is necessary, especially in large vessels, to navigate with any degree of safety between or near them. The best time is between half flood and high water, but there exists only one continuous leading mark for the passage between them, viz., the church of St. Pierre-les-Moutiers, which has a very low turret and stands on the high land northeastward of Cape de Carteret (apparently in the middle of the village and the only church so situated), kept a quarter of a point open eastward of the southeastern pitch of that cape 11°. Even this mark is very distant and not sufficiently conspicuous, nor do the objects open or close with each other quickly enough for so narrow a passage. The mark is useful, however, when coming from the northward, but too distant to be of much service when entering this passage from the southward, unless the weather is unusually clear.

From the northward the leading mark given must be carefully preserved until the white Semaphore House at La Moye, Jersey, opens southward of Le Fret Point 293°, or until Coutances Cathedral appears midway between Blainville and Agon Churches 96°, and it must always be remembered that both tidal streams set obliquely across the vessel's course.

St. Germain Bay—Anchorage.—This bay is formed by the land receding eastward between Senequet Rock and Cape de Carteret. It affords shelter in its northern part from winds between 6° and 119° in a depth of 5 fathoms, good holding ground of sandy clay, but southward of the Bancs Feles vessels should nowhere approach the land nearer than 3.5 miles, to avoid several patches of from 4 to 8 feet water only. The best anchorage is with Cape de Carteret Lighthouse about 350° and Pirou Telegraph Tower from 119° to 108°, but nothing southward of this latter bearing, for fear of fouling the telegraph cable.

Telegraph cable.—The telegraph cable from Fliquet Bay, Jersey, runs direct to Pirou, on the French coast, where the position of its shore end is marked by two beacons, painted with white and blue horizontal bands and having round top marks. The front beacon is situated on the coast close to the telegraph house; the rear beacon is distant 200 yards 110° from the front one. Vessels should avoid anchoring or dredging anywhere near the line of the cable.

Tides.—It is high water, full and change, at St. Germain at 6 h. 20 m.; springs rise 34 feet, neaps 25 feet.

Sac-de-Pirou Rocks, 1.3 miles offshore, but only just outside the low-water line, are 1.5 miles northwestward of the little harbor of Geffosse, and 189° 4 miles from the entrance of St. Germain. They are the western part of a long ridge, 1,200 yards wide, which extends southwestward from the shore; the highest head uncovers 5 feet and the westernmost head 4½ feet. The marks for the western head are Mont Survent Church steeple, on the high land 4 miles in the interior, just open northward of Geffosse Church steeple 108°, and Bretteville Church steeple, open westward of the hill which rises a little westward of the old semaphore on the western point of entrance to St. Germain 358°.

A sand bank, ¾ mile long north and south and ½ mile wide, with from 4 to 8 feet water, lies 1,400 yards westward of these rocks and 2 miles from the shore; it is dangerous to vessels working up inshore, and may be avoided by keeping Mont Gardon Church steeple open northward of the guardhouse of the battery on the western point of entrance to St. Germain. There are also two small sand banks with 7 and 8 feet water over them between the Sac-de-Pirou and the Senequet Rock; in fact, at 2.3 miles from the shore, between the Senequet and St. Germain, the depth does not average more than 15 feet. Senequet Lighthouse in line with Ronquet Beacon turret 168° leads well outside this depth.

Geffosse, 46° 3.8 miles from Senequet Lighthouse and 4.5 miles southward of St. Germain, is a very small harbor, only capable of affording shelter at high water, springs, to fishing boats of about 10 tons burden; it is quite open to 276° and when it blows hard from that quarter there is a nasty tumbling sea at the entrance.

St. Germain-sur-Ay.—This little harbor, lying 15° 7.3 miles from Senequet Rock Lighthouse and 147° 12 miles from Cape de Carteret, admits vessels drawing 7 or 8 feet at high water, springs, but a vessel of that draft will be neaped within it for 5 or 6 days. The sand banks, both inside the harbor and at the entrance, are so liable to shift that it is not prudent to enter without a pilot. It is well sheltered on all sides except from southwestward to south, and strong winds from that direction send in a heavy sea.

The strand uncovers 1.5 miles outside the entrance, and the Cabot with several other rocks rise from it exactly in the fairway. The channel leading to the harbor is very narrow, and lies between the Cabot and a rock about the same height 600 yards 321° from it. The leading mark in is St. Germain Church steeple in line with a remarkable gap in the sandhills on the long narrow eastern point of entrance bearing 26°. When the Cabot is covered there is a depth of 4 or 5 feet at the entrance.

The Cabot Rock lies at the southeastern extreme of a ridge extending 1.5 miles 265° from the western point of entrance to St. Germain. It is the highest and nearest rock to the entrance, uncovers 25 feet, and bears 156° 1,600 yards from the guardhouse on the western point of entrance, with the guardhouse just open eastward of the old semaphore. The southern part of this ridge does not cover during neaps, and they are the highest rocks between St. Germain and Cape de Carteret. A sand bank, with only 7 feet water and from 18 to 22 feet around, lies 1.3 miles outside the ridge and 260° 2.3 miles from the old semaphore. This little bank is extremely dangerous to coasters working up along shore, and as no marks for it can be given they should keep from 2½ to 3 miles from the land.

Surville, 5 miles northward of St. Germain and 139° 7.3 miles from Cape de Carteret, is a small harbor with a sandy bottom, and does not admit vessels drawing more than 7 feet at high water, springs. The bottom outside for 3 miles southwestward of it is very uneven, several little ridges with from 8 to 18 feet rising from it. A small rocky ridge with only 4 feet over the highest head and from 12 to 19 feet close to lies 226° 1.8 miles from the entrance; no marks can be given for this dangerous reef.

Basses de Taillepied.—The Basses de Taillepied and Bancs Feles lie nearly midway between the Ecrehos Rocks and the shore, and the center of the shoals is about 4.5 miles 186° from Cape de Carteret; they form one bank and occupy a space 4 miles long 288° and 108° and about 2 miles wide, the body of the shoals lying southwestward of that line. The Basses de Taillepied form the western side of the shoal, extend 3 miles 321° and 141°, and are 600 yards wide. They consist of from 20 to 25 rocky heads, of which the highest, in the northern part of the chain, uncovers 2 feet at the lowest tides, at which time the other heads have from 1 to 14 feet over them.

The marks for the rocky head of 8 feet near the northern end, from which Cape de Carteret Lighthouse bears 29° 4.5 miles, are Rozel Mill, Jersey, just showing northward of Maitre Ile, Ecrehos, 234°, and Mabire Windmill on with the eastern slope of the hill of Cape de Carteret 37°. From the rocky head of 9 feet at the southern end, Plemont Point, Jersey, open northward of Ronez Point bears 265°, and St. Pierre steeple well open eastward of Cape de Carteret 15°.

Bancs Feles, forming the eastern side of the shoal, consists of about 20 narrow parallel ridges of coarse sand and shingle averaging about 600 yards in length. The ridges lie close together nearly at right angles to the flood and ebb streams, and occupy a space 2 miles in length northwest and southeast by ½ mile in width. Three of the ridges dry at the lowest tides, and then there is only a depth of from 2 to 4 feet over the remainder.

From the northwestern extreme of the Bancs Feles, which has on it a patch of 13 feet, Cape de Carteret Lighthouse bears 15° 4 miles, and the Trois-Grunes 324° about the same distance; near the southeastern extreme is an 8-foot patch, from which the lighthouse bears 347° 5.3 miles, and Caillourie Islet, in the entrance of Port Bail, 47° 8.7 miles.

Clearing marks. — Mont Orgueil Castle, Jersey, in line with Maitre Ile 215°, or St. Pierre spire in line with Cape de Carteret Lighthouse, a very close mark, leads northward of these shoals in 3½ fathoms. Rozel mill on with Coupe turret 258°, or St. Martin's spire, Jersey, in line with St. Catherine's Breakwater Lighthouse 261°, leads southward of the Ecreviere, Taillepied, and Bancs Feles. Cape Flamanville on with Cape de Carteret 341°, leads very close to the southeastern extreme of the Bancs Feles; and the leading lights of Port Bail in line 40° or the steeple of Port Bail between the mills of Carteret, leads 600 yards southeastward of it. These mills stand 600 yards eastward of the mill of Bien-Aime.

The passage between the Bancs Feles and the French coast is 2.3 miles wide, with patches of from 7 to 12 feet in it. It is the channel generally used and the leading mark is good, viz, the northwestern peak of the high light-colored sand hills of Hatainville shut in with

Cape de Carteret 350°; or, for deeper water, Cape Flamanville just shut in with Cape de Carteret.

The channel between the Taillepied and the Ecrehos Rocks is 1.5 miles wide, with a patch of 11 feet in its southern entrance, but no leading mark for it can be given. From the great rapidity of the streams there is generally a turbulent sea in this passage even in the finest weather, and in rough weather it is exceedingly dangerous for small vessels to attempt it.

Port Bail.—The entrance to this harbor is 8 miles northward of St. Germain and 130° 4.5 miles from Cape de Carteret Lighthouse. It is the best harbor between Cape de la Hague and Granville, and has the advantage of being in direct railway communication with the general system of the country, but its trade is quite insignificant.

Depths.—There is a depth of 13 or 14 feet in the entrance at high water, springs, and the harbor is accessible for one hour before or after that period. At high water, neaps, boats of 6 feet draft can not always enter. The bottom is sand, which dries from half ebb to half flood. The little river Grise discharges itself into the harbor.

The entrance is not more than 200 yards wide, and is open to the 209°. It lies between the southern point of the harbor and Caillourie, a sandy islet on which stands the customhouse and the outer leading light, on Dune Point, its southeastern end. The islet is from 25 to 30 feet above the level of the bottom of the harbor and is 1,100 yards southwestward of the village of Port Bail. Southeastward of it is a bed of pebbles and small stones about 200 yards in extent, which should be avoided, and, southward of it, a rock which does not cover.

Rocks.—A rock with 6 feet over it at lowest spring tides lies in the approach to Port Bail, about 1.5 miles from the shore and 300 yards northward of the leading marks for entering. With port Bail leading lights in line, at 1.8 miles from the outer (white) light, there is a small rocky patch of 2 feet least water, and 750 yards inside of this, on the same line, a rocky head, which is awash at lowest tides.

Buoys.—A bell buoy, painted red and black in horizontal stripes and surmounted by a globe, marks the entrance, and two conical buoys, one painted in black and white horizontal bands and the other black, mark the channel into Port Bail. There are also some mooring buoys where vessels may moor head and stern in the direction of the channel. The position, however, is very exposed, and no vessel should make use of these buoys except in fine, settled weather.

Lights.—Two fixed harbor leading lights are established at Port Bail, the inner red light being shown from the church tower and the outer white light from a gibbet on a little white shed at Dune Point, distant from the inner light 220° 953 yards. The red light is visible

9 miles, for about 16° on either side of the leading line; the white light shows all round seaward and is visible 7 miles.

Semaphore.—There is a semaphore station on the sand hills at the outer northern point of entrance.

Directions.—The leading mark into this harbor is the two lights in line, or the steeple of Port Bail Church between the two mills of Carteret 40°. The berth where the tide rises highest is on the bed of the fresh-water stream 51°, and east of the southern point of entrance, but it is an uneasy position when it blows hard from NW. by W. Here the depth is from 16¾ to 19¾ feet at springs, but in running in the lead must be kept going to avoid the bank of the stream. The best berth, but with 3¼ feet less water, is about 400 yards southwestward of the guardhouse near the shore 600 yards 141° of the church steeple; here a vessel is sheltered on all sides except from 276°. Coasters, trading between this place and Jersey, take up a position in the bed of the stream in front of the village.

The Jument and Grand Rocher are two rocks southwestward of the entrance to Port Bail. The first is at low-water mark, 1.3 miles from the southern point of entrance, and uncovers 11½ feet; the other is 1.5 miles from the same point, about 1,400 yards southward of the Jument, and uncovers 14¾ feet. Two of the rocks previously mentioned lie about 300 and 600 yards 276° of a line joining these.

Basses de Port Bail are three small rocky ledges and a sand bank fronting the entrance of Port Bail; they are about 1.3 miles in extent north and south, with from 6 to 9 feet water on the shoalest parts, and lie from 1 mile to 1.5 miles offshore. The northern end in 9 feet is 153° 3.5 miles, nearly, from Cape de Carteret Lighthouse. The sand bank has 8 feet water, and is about 1.8 miles from the shore, with Gouey steeple in line with the summit of Caillourie Islet 54°.

Several other rocky patches lie northward of the Basses de Port Bail, from 1,000 to 1,600 yards outside low-water mark and in the direction of the entrance to Havre de Carteret.

Cape de Carteret is the western extreme of the steep hill which bounds the entrance of Havre de Carteret on its western side. This hill is the first high land on the coast northward of Granville, and is separated from the high land of the interior by a valley nearly 600 yards wide, almost entirely filled by drift sand from the neighboring sand hills. The cape is rather higher than Rosel Point, 6 miles northward of it, and may be seen in clear weather from a distance of 17 or 18 miles; it terminates in an abrupt declivity, beneath which is a cliff of sloping rocks.

Light.—Cape de Carteret Lighthouse, a square tower, 49 feet in height, stands about 230 yards eastward of the extreme of the cape and exhibits a group flashing white light. It is elevated 262 feet above high water and is visible 23 miles; it is seldom obscured by fog.

From the lighthouse Granville Lighthouse bears 167° 33 miles, Cape de la Hague Lighthouse 347° 21.8 miles, Cape Flamanville and Nez de Jobourg projecting seaward of this line, and St. Catherine's Breakwater Lighthouse, Jersey, 220° 12.3 miles.

Semaphore.—There is a semaphore station on Cape de Carteret near the lighthouse.

Havre de Carteret, a mile eastward of Cape de Carteret and 316° 4 miles from Port Bail, dries above the half-tide level, but admits vessels of 10 or 11 feet draft, at springs, for half an hour before and after high water, and of 6 feet less draft at neaps. The entrance, about 100 yards in width, is between two stone piers, of which the western is always above water, and from its head a tide light is shown, while the eastern jetty, being lower, covers at high-water springs and is marked by a beacon at its outer end. The western pier, commencing at the foot of the steep eastern part of the cape, is about 640 yards long; the eastern pier does not project quite so far seaward.

The harbor is open to the southward, and during the time it is accessible the stream runs strongly across the entrance to the northwestward, but between the piers it takes their direction, the ebb stream, especially, running with great velocity.

This little port is quite useless for purposes of shelter, and the trade is insignificant; supplies of any description can only be obtained with difficulty and in small quantities. It is 24 miles distant from Cherbourg by road, but is the terminus of a branch line of railway communicating through Port Bail with the general system; it is occasionally visited by small passenger steamers from St. Helier.

Tidal light.—From a white mast above a shed on the west pierhead, elevated 18 feet above high water, is exhibited a small fixed red light, visible 3 miles. The light is shown continuously.

A lifeboat is stationed at Havre de Carteret.

Directions.—The leading mark for the channel into Havre de Carteret is de Carteret steeple in line with the door of the lifeboat house. A small red buoy marks a bank nearly in mid-channel at the entrance. There is, however, more water over the bank than at the berths in the harbor, but it is best to pass westward of the buoy, where there is 3 feet greater depth than on the bank.

The coast.—Northward of Cape de Carteret the coast is remarkable from the sand hills of Hatainville, which are visible from a great distance on account of their whiteness, forming a great contrast to the dark land of Capes de Carteret and Flamanville and rendering them most useful to the mariner as a land mark. Four miles northward of them is Rosel Point, bluff and rocky, with dangerous reefs extending more than a mile from it; 3.5 miles northward of Rosel Point is Cape Flamanville, also high and bluff. The Anse de Sciotot, with a low sandy shore in its southern part but high and rocky as Cape Flamanville is approached, lying between them.

Northward of Cape Flamanville is Port Dielette and the extensive Anse de Vauville, affording good shelter in easterly winds. The southern shore of this bay is low and sandy, rising to high land in the interior. The northern part is high and rugged, terminating in the precipitous Nez de Jobourg, 420 feet above the level of the sea and 9.5 miles northward of Cape Flamanville. From this point the land falls toward Cape de la Hague, which is distant 3 miles and is low, sandy, and surrounded by off-lying dangerous rocks, on the highest of which, the Gros du Raz, stands the lighthouse.

There are no hidden dangers in the offing between Cape de Carteret and Cape Flamanville except the Plateau des Trois-Grunes, but from the broad sandy beach between those capes are shallows, which must be avoided at low tide, extend offshore from 1.3 to 2.8 miles. The most prominent parts of these shallows are the Roches-du-Rit, the Basse Bihard, the Caillou, and the Banc de Surtainville. The first dries, the others break at the lowest tides.

Northward of Cape Flamanville the offing remains clear of danger until the Nez de Jobourg is approached, southwestward from which point, distant from 1 to 2.5 miles and with a clear passage inshore of them, are the Basses St. Gilles, Huquets de Jobourg, Huquets de Vauville, and other dangerous reefs, on which some heads uncover as much as 16 feet and all of which may be avoided by keeping Rosel Point well open of Cape Flamanville.

Plateau des Trois-Grunes.—The northern edge of this dangerous reef bears 271° 3.8 miles from Cape de Carteret Lighthouse; it is about a mile long northwest and southeast, from 500 to 1,600 yards wide, and has depths of from 6 to 9 fathoms around it. It consists of a dozen rocky heads, of which two uncover from 3 to 5 feet at the southeastern extreme of the ledge and are 100 yards apart.

From the highest head Cape de Carteret Lighthouse bears 80° 3.5 miles, the southern extreme of the Roches-du-Rit 68° 3 miles: the summit of Cape de Carteret is between the lighthouse and the little battery at the foot of the cape, and Rozel Mill Jersey is just open southeastward of Grande Rousse Rock, Ecrehos Group, 216°.

There are four or five rocky heads on the northwestern part, of which the highest has 5 feet water; from it the northernmost of two remarkable mills at Vislet, or Brenier, is a little open southward of the southern fort on Cape de Carteret, and the western part of Mont Orgueil castle is in line with the eastern side of Petite Rousse Rock, Ecrehos.

The overfalls in the vicinity of the Plateau des Trois-Grunes are very violent.

Buoy.—A conical buoy, painted in horizontal black and red bands, with top mark and the letter K, is moored southwestward from the southeastern and highest head of the Trois-Grunes. Dependence should not be placed upon this buoy being in position, as it frequently breaks adrift.

Clearing marks.—The Vielle Rock, Ecrehos, in line with Mont Orgueil Castle, 208°, leads 700 yards southeastward of the highest head on the ledge; the square tower of Barneville Church, in sight southward of Cape de Carteret, 71°, leads 1,500 yards southward; St. George's Church steeple on with the foot of the southern slope of the hill of Cape de Carteret, 98°, leads 1,200 yards northward of the northern part of the ledge (this steeple may be easily identified by the parsonage, a long, white house which appears in this direction); the southeastern fort on the cape shut in by the western pitch of the cape, on which there is a battery, also leads clear to the northward, and Mont Orgueil Castle, its own apparent breadth open westward of Grande Rousse Rock, 192°, leads westward.

By night, Cape de la Hague Light on with the Nez de Jobourg leads over the center of the shoal; the light well open westward of the Nez clears its western side. This is a useful mark from the northward in clear weather, but the light can seldom be seen so far southward as the Trois-Grunes.

A bank of sand and broken shells lies 3.5 miles northwestward of the Trois-Grunes and 4.5 miles 18° from the Drouilles Shoals; it has 9 fathoms over it and a depth of 13 to 14 fathoms around, is about 800 yards in extent, and is not of itself dangerous, but causes a strong overfall, which small vessels should avoid when it is blowing fresh.

Roches-du-Rit.—Between Cape de Carteret and Rosel Point the sands uncover from 400 to 1,600 yards from the shore, and several rocky ledges rise from them, of which the most dangerous are the Roches-du-Rit. Their southern end is about 1,600 yards 310° from Cape de Carteret Lighthouse; from thence the outer part of the ledge extends 327° 1 mile, terminating in this direction 1.8 miles 321° from the lighthouse. Shoal water of from 2 to 3 fathoms extends 1,400 yards westward of the reef and for double that distance to the northward.

The Nez de Jobourg open 6° westward of Cape Flamanville leads close westward of the rocks, and the white steeple of Port Bail on with the foot of the escarpment under the battery at the extreme of Cape de Carteret leads southward, but this mark can not be seen at low water, the intervening sand hills then hiding the steeple. Care must be taken not to approach the cape too closely at low water, as rocky heads with only 4 or 5 feet water extend ½ mile westward from the lighthouse.

Banc de Surtainville consists of four long, narrow ridges of sand and broken shells occupying a space 1.3 miles long northwest and southeast, extending 2 miles from the shore and in some measure united with the beach. There is a depth of from 18 to 22 feet on the two western ridges, 11 to 21 feet on the middle, and 19 feet on the southeastern ridge. These little ridges lie athwart the streams and occasion a heavy sea when it is blowing fresh.

Basse Bihard, the outermost of these dangers, is a small rocky flat northwestward of the Banc de Surtainville, with a narrow 8-fathoms channel between them, 2.5 miles from the shore; it is about 300 yards in extent, with only 6 feet water over its highest head, from which Cape de Carteret Lighthouse bears 141° 5¼ miles; Rosel Point is distant 2.5 miles, and Pieux Church open northward of Rosel Point and in line with a remarkable red-tiled house near the beach, bears northeast. At low water it is very dangerous, and the overfalls cause a heavy sea over it at all times of tide.

The Caillou Rock is an isolated head, with only 12 feet water, east, ½ mile from the Bihard, from which it is separated by a sandy bottom with from 7 to 8 fathoms; it is close to the northern edge of the Banc de Surtainville, and still more dangerous than the Bihard, as there are no marks for it.

Clearing marks.—Cape de Carteret Lighthouse kept eastward of 133° until Rosel Chapel is open northward of the northern part of Rosel Point leads outside all these shoals. Jobourg Church steeple on with the extreme of Cape Flamanville 355° leads between the two western ridges of the Surtainville Bank and 300 yards eastward of the Caillou Rock. By night Cape de la Hague Light just open westward of the western slope of the Nez de Jobourg leads ½ mile outside these shoals and well outside all foul ground off Rosel Point.

Rosel Point bears 347° 6 miles from Cape de Carteret and 156° 3.3 miles from Cape Flamanville, and terminates in a bluff rocky promontory on the summit of which stands a guard house. The point is skirted by rocks running off nearly 600 yards in a southwest by south and 1,300 yards in a northwest by north direction from the foot of the cliffs, and westward of it the depth is less than 3 fathoms at a mile from the point; to avoid this foul ground it should not be approached nearer than 1.5 miles nor within a depth of 10 fathoms.

Anse de Sciotot, between Rosel Point and Cape Flamanville, affords shelter from winds between northeast by north and southeast by east in depths of from 7 to 10 fathoms, sandy bottom, but the holding ground is indifferent; a vessel should anchor midway between the points immediately the Nez de Jobourg shuts in with

Cape Flamanville. The shore is low and sandy from the head of the bay to Rosel Point, but high and rocky toward Cape Flamanville.

Cape Flamanville—Semaphore.—Cape Flamanville is a high bluff point with a guardhouse and semaphore on its summit; from it the Nez de Jobourg bears north about 9 miles. It should not be aproached nearer than 1,600 yards nor within a depth of 10 fathoms, as it is skirted by dangers extending ½ mile from the shore; they, however, may be avoided by day or night by keeping Cape de la Hague Lighthouse in sight westward of the Nez.

High granite cliffs form the shore from Cape Flamanville as far as Diélette, beyond which the low sandy shore of the Ans ede Vauville commences.

Dielette, in the southern part of the Anse de Vauville and 2 miles northeastward of Cape Flamanville, has an inner and outer harbor sheltered from northeast round by east and south to southwestward by the high land, and from southwestward round by west to northward by a granite outer pier constructed about 360 yards northwestward of an inner pier, and forming the outer harbor, which is exposed to so much swell and surf that it is very little used; but the outer pier breaks the sea and greatly increases the security of the inner harbor, which, however, affords anything but good grounding places, the bottom being of hard sand and gravel.

Depths.—The outer harbor has a depth of 3 feet in the entrance at the lowest tides; at high water springs, it has 30 feet, and at neaps 6¼ feet less. The inner harbor shoals steadily from the entrance to the head; in the entrance it dries 16 feet, has a depth of 11 feet at high water springs, and only 4¾ feet at neaps.

The outer pier extends from the shore in a northerly direction 252 yards to the Rognouse Rocks, which there form its foundation, and then curves eastward 155 yards to the eastern part of those rocks. The channel between the end of this pier, on which stands a lighthouse, and the shore rocks eastward of it, marked by a beacon near their edge, is about 164 yards wide.

Rocks.—A rock with a depth of 6 feet on it at low water lies in the approach to Dielette Harbor, with the outer pier lighthouse bearing 134°, distant 550 yards; another rock, with 1 foot less water, lies 150 yards 122° from the above. These rocks are very near the leading mark (lights in line) for entering the port.

The beacon on the eastern side of the channel stands on a rock which uncovers 17 feet eastward about 200 yards from the outer pierhead and 336° 350 yards from the inner pierhead. This rock is on the southern edge of the rocky bed joining the shore northeastward of the harbor, and which, in rough weather, greatly breaks the force of the sea. The channel lies 310° and 130°, and is narrowed by low rocky ledges, which uncover at low water 200 yards outside both the beacon and the outer pierhead. In rough weather, these ledges cause a heavy sea, to be avoided by keeping in the direction of the channel, which, near the entrance of the old harbor, is suddenly narrowed by the Pierre de la Riviere, a rock lying 54° 100 yards from the inner pierhead, and very dangerous to vessels working in.

The inner harbor admits vessels of about 10 feet draft at springs, but the entrance is so surrounded by rocks that access to it is hazardous except at high water and with a leading wind. The pier forming the inner harbor is about 186 yards in length. The entrance is 72 yards wide and open to 6°; it is between the inner pierhead and the extreme of a little pile of loose stones on the steep eastern shore of the harbor. From thence the bottom, of hard sand and gravel, takes a gentle ascent to the level of high water neaps. The best position for grounding is about two-thirds the length of the pier from the pierhead, but as the bottom is hard, precautions must be taken to prevent the vessel falling over.

Although extensive works form this harbor, a few fishing boats only belong to the port, and its trade is very insignificant, being represented by about 60 small coasters, averaging 40 tons, calling annually.

A lifeboat is stationed at Port Dielette.

Lights.—Two lights, 507 yards apart, are exhibited at Port Dielette, and when in line bearing 130° they lead through the channel toward the entrance of the harbor.

The outer light, exhibited from a white masonry turret on the outer pierhead, at an elevation of 38 feet above high water, shows fixed red over Anse de Vauville in the direction of the Huquets de Jobourg or when bearing from 139° to the shore, and fixed white from all other directions. The white light is visible at 7 miles, red light at 4 miles.

The inner light, fixed red, is shown from the window of a dwelling at the head of the port at the height of 72 feet above high water and is visible 8 miles. The light is visible through an arc of 16° on each side of leading line 130°, power increasing as that line is approached.

A small fixed green light is shown on the inner pierhead. This light in line with the inner leading light leads into the harbor.

Directions.—When nearing the port, keep a good lookout for the beacon on the eastern rocks, and steer to pass between it and the lighthouse on the outer pierhead, passing about 100 yards from the lighthouse, and then direct for the inner pierhead, which round as closely as possible in order to avoid the Pierre de la Riviere.

With moderate winds from westward round by north to northeastward, these directions can be followed from half an hour before to half an hour after high water by vessels drawing not more than

10 feet; but when the wind is fresh from that quarter, they can only enter at the top of high-water springs.

With the wind between west and south, a position should be gained southwestward of the harbor before bearing up for the lighthouse. With a head wind, the channel should not be attempted without a pilot.

Tides.—It is high water, full and change, in Port Dielette at 6h. 40m.; springs rise 27 feet, neaps 20¾ feet, above the zero of soundings.

Anse de Vauville, between Cape Flamanville and the Nez de Jobourg, affords good shelter against all winds from south round by east to northeastward in depths of from 4 to 12 fathoms, fine hard sand. This bay is much resorted to by merchant vessels and coasters overtaken by light winds, unable to save their tide through the Race of Alderney, or waiting for sufficient water to cross the flats southward of Cape de Carteret; they should, however, be prepared to weigh and gain an offing if the wind veers to the westward. When the wind is offshore, and particularly if strong from the southeastward, there is a heavy surf on the beach which renders landing impossible; but 1 mile from the shore the sea is smooth and there is but little swell. At the head of the bay between the villages of Siouville and Vauville, distant from each other 4.5 miles, the shore at the foot of the highland is low with numerous sand hills.

Northeastward of the Sidman a black beacon with cylindrical topmark marks the position of the west Mecel Rock.

Nez de Jobourg—Semaphore.—From near Vauville the coast rises and for about 4 miles consists of rugged cliffs 300 feet high, intersected by deep and narrow valleys, terminating westward in this high bluff promontory 420 feet above the sea level, which may be seen in clear weather at a distance of 24 miles. There is a semaphore station on its summit, a small hummock, of which the slopes extend to the edge of the nearly perpendicular cliffs on its western side. About 1.8 miles inland, eastward of the Nez, stands Jobourg Church, a conspicuous and useful sea mark.

Northward of the Nez, 3 miles distant, is Cape de la Hague, low and sandy; and southeastward of it the high, rugged coast for 4 miles is bordered by rocks as far as 600 yards from the shore; of these the most dangerous are the Huitriere, Sidman, Foraine, Brequets, and Ronde. The three first uncover from 10 to 14 feet at the lowest tides and the Ronde 16 feet; the Brequets never cover.

The Dossiere Rock.—The Nez de Jobourg is surrounded by a rocky barrier extending 1 mile northwestward and terminating in the Basses de la Dossiere, two rocky flats having only 9 feet water on them. The Dossiere Rock, 800 yards northward of the Nez, uncovers 15 feet and is the highest rock of the barrier. It gives a useful indication to local pilots of the state of the tidal stream in the offing, as it covers at about half flood tide by the shore, at which time the flood or northern stream begins to be felt round the Nez and in the Race of Alderney. The Greniquet Rock in line with the low point of Cape de la Hague leads close westward of the foul ground surrounding the Nez.

Southwestward and southward of the Nez de Jobourg and occupying a space of nearly 2.5 miles 286° and 96° are several dangerous shoals, with a passage between them and the coast, of which the principal are the Huquets de Jobourg, the Basses St. Gilles, the Huquets de Vauville, and the Calenfriers.

Huquets de Jobourg is the general name of the whole of this rocky range, which lies parallel with and about 1.3 miles from the shore, between the bearings 217° and 150° from the Nez de Jobourg. The highest heads at its western and eastern extremes are the Basses St. Gilles and Huquets de Vauville.

Basses St. Gilles are four rocky heads at the western end; on that at the northeastern point of the Basses there is a depth of only 7 feet water. The western head, with 19 feet, lies at the western extreme; the highest, with less than 6 feet at lowest tides, lies about midway and almost in a direct line between the two described. The fourth is a small isolated rock with 4¾ fathoms, lying 500 yards southward of the 7-foot rock.

Huquets de Jobourg.—The highest rock on the central part, or Huquets de Jobourg proper, between which and the St. Gilles is a passage ½ mile wide, with from 9 to 11 fathoms, uncovers 14 feet. The Calenfriers, two small rocks at the northwestern part of the reef, uncover 2 feet.

Huquets de Vauville are 700 yards eastward of the Huquets de Jobourg and form the eastern extreme of the range; they are of small extent, and the highest head, which uncovers 16 feet, is considered a half-tide rock by the pilots, who, when awaiting in Vauville Bay the most favorable moment to cross Alderney Race, weigh when its summit is about 2 feet above water, and gain an offing in order to pass westward of the St. Gilles.

Clearing marks.—The pitch of Rosel Point well open of Cape Flamanville 153° leads clear westward of the Basses St. Gilles; Cape de la Hague Lighthouse in line with the summit of the Greniquet Rock 1° leads 500 yards eastward of the 7-foot head, midway between it and the Huquets de Jobourg.

When running through the Race of Alderney from the southward it is prudent not to shut in Rosel Point, and at night not to bring Cape de la Hague Light more northerly than 23°, unless within an hour of high water, until well clear of these rocks.

Caution. — The flood or northeastern stream begins to gain strength when the Huquets de Vauville and the Dossiere Rock cover, and runs with great rapidity toward the dangers just described, and over the rocky barrier surrounding the Nez de Jobourg. A sailing vessel, therefore, entering the channel, 1 mile wide, which separates the Huquets de Jobourg from the coast, is liable to be set on this barrier, unless the wind is favorable and sufficiently strong to insure her stemming the stream.

Directions.—Having passed through the Race of Alderney from the northward and intending to anchor in Vauville Bay, the best shelter, with the wind between northeast by north and east by north, is on the northern side of the bay under the high land southeastward of the Nez de Jobourg; but, to avoid the dangers off the Nez, do not bring Cape de la Hague Lighthouse northward of 23°, and keep Rosel Point well open of Cape Flamanville until the the Nez bears 35° and Vauville Church 82°, when stand in for the anchorage on the latter bearing. With the wind between east by north and south by east, the best shelter is under the high land of Cape Flamanville on the southern side of the bay. In rounding that cape, however, from the southward, care must be taken to avoid the foul ground off it, which, at night, may be done by keeping Cape de la Hague Light in sight westward of the Nez, or by not standing into less than 10 fathoms until well northward of Cape Flamanville, when a berth may be taken up by a bearing of Port Dielette outer red light. A vessel steering eastward into Vauville Bay will find Dielette Light change its color from white to red on the bearing 139°.

Cape de la Hague, the northwestern extreme of Normandy, 3 miles northward of the Nez de Jobourg, is low and sandy. From it the eastern extreme of Alderney bears 271° 8.3 miles, and the western end of Cherbourg Breakwater is 11.8 miles distant on a 105° bearing. The most conspicuous objects in the vicinity of the cape are the lighthouse on the Gros du Raz Rock, the tower of Jobourg Church, the village of Auderville, with its small church tower, not easily distinguished, and the Church of St. Germain de Vaux, with its square tower and spire.

Light.—From a circular tower, 154 feet in height, on the summit of Gros du Raz 248° ½ mile from Cape de la Hague, and the largest rock in its vicinity, is exhibited at an elevation of 154 feet above high water, a flashing white light, visible 18 miles. The light is seldom obscured by fog or mist.

Fog signal.—There is a foghorn sounded at the lighthouse.

Tides.—It is high water, full and change, at Cape de la Hague at 7h. 6m. Springs rise 21½ feet, neaps 18 feet, above the zero of soundings.

Semaphore.—There is a semaphore at Cape de la Hague. The station, known by the yellow house of the keeper and the white mast, is on a low sand hill at the extreme of the cape.

Dangers surrounding Cape de la Hague.—From 1.5 miles miles southward of the lighthouse to the Houffet Rocks, about the same distance eastward of the cape, the coast is skirted by many dangers, rendered all the more formidable by the strength and turbulence of the tidal streams in their vicinity. Local pilots under favorable circumstances sometimes take vessels of less than 15 feet draft by an inshore passage between the detached rocks and the beach, for during fine weather the tides there are less rapid and the sea less disturbed than in the wide channel of the Alderney Race. No vessel, however, should attempt this passage without an experienced pilot.

The principal dangers in the vicinity are the Greniquet, Diotret, Foraine, and Noires Ledges, lying southward and westward of the cape, and the Grunes, Becchue, Ronde, and Houffet Rocks, lying northward and eastward of it.

The Greniquet, of which the summit is 11 feet above high-water springs, is 600 yards from the shore abreast of Calenfrier and 181° 1 mile from the lighthouse.

The Diotret bears 4° 700 yards from the Greniquet, and its summit covers only at high equinoctial tides.

The Foraine Rock — Beacon turret. — This, the westernmost rock, is nearly a mile from the shore immediately fronting the little harbor of Goury and 240° 1,400 yards from the lighthouse: on it stands a red beacon turret, 13 feet above high-water level, with short iron mast and conical top mark. The rock uncovers 14 feet, a half-tide rock, and is a valuable guide for the state of the tidal stream, for, as with the Dossiere, near the Nez de Jobourg, when it covers, the northeastern stream begins to be felt in the Race of Alderney, and the southwestern stream when it uncovers. This rock is, however, extremely dangerous to vessels passing in its vicinity on account of the streams setting directly over it.

The valley of the Dielette, open westward of the Nez de Jobourg or Flamanville Church steeple midway between Cape Flamanville and the Nez, lead westward of the Foraine Rock.

Vignes Rock, inshore of the Foraine and 175° 700 yards from the lighthouse, has its south head uncovering 8 feet at lowest tides, upon which is a metal beacon with cylindrical top mark painted black. A black buoy is moored off the western side of this rock.

The Noires.—The space northeastward of the Foraine, between it and the Gros du Raz, is filled with shoals and rocks called the Noires, of which the highest, midway between the lighthouse and the Foraine, uncovers 21 feet.

The Galet, a sunken rock, with only 1 foot water, lies 4° ½ mile from the lighthouse.

The Grunes.—The Grande Grune, a dangerous reef with only 2 feet water on the shoalest part, lies 15° about 1,600 yards from the lighthouse and 1,200 yards from the shore. The Petite Grune is about 700 yards eastward of the Grande Grune. It is about 500 yards long northeast and southwest, and has near the center two rocky heads which uncover about a foot. It lies about ½ mile offshore, and the sea breaks with great fury during a weather tide both on it and on the Grande Grune.

The Becchue, a large rock about 800 yards from the shore and 57° 1.3 miles from the lighthouse, is the northernmost of all the rocks which do not cover between the lighthouse and St. Martin Bay. Its summit rises 4 feet above the level of high-water springs. At low water a number of rocky heads appear within a circuit of 500 yards around the Becchue. The Porchet, the westernmost of these heads, uncovers 4 feet and is about midway between the Becchue and Petite Grune.

The Ronde, 18° 400 yards from the Becchue, uncovers 5 feet and is the outer rock in this direction. At 800 yards 108° from the Becchue is the outer extreme of the Houffet Rocks, on which are several heads 3 or 4 feet above the level of high-water springs.

Clearing marks.—Cape de la Hague Lighthouse on with the pitch of the cliff of the Nez de Jobourg leads 500 yards westward of the Grande Grune. The northeastern extreme of the Houffet Rocks in line with the Esquina Rock near the eastern shore of St. Martin Bay, the largest and highest of all the rocks near the shore between Cape de la Hague and Omonville, bearing 111° 200 yards, leads northward of the northern head of the Petite Grune. The Esquina Rock in line with Nacqueville Church steeple 122° leads northward of the Houffets, 700 yards northward on the Ronde, and 1,500 yards northward of the Grunes.

Coast eastward of Cape de la Hague.—For the continuation of the coast eastward of Cape de la Hague, see Chap. IX.

Goury.—This little harbor or grounding place on a beach of pebbles and gravel at the head of a small elbow in the shore is about ½ mile southward of Cape de la Hague Lighthouse; it is sheltered by the land from winds from northwest by north round by north and east to south by west, and protected from the heavy swell which sometimes rolls in from the westward by a stone jetty about 123 yards in length, and by the rocks upon which the jetty is built. The harbor affords a useful shelter for small coasters, and the supplies for the lighthouse are embarked from it, but it has no trade of the least importance.

The entrance, bearing 68° 600 yards from the Diotret Rock, is between two large rocks joining the shore; that on the southern side, named Jet d'Amont, is awash at high-water neaps; and that on the northern side, Jet d'Aval, is about 2 feet above that level.

A red beacon marks the Hervieu, which adjoins the shore on the south side of the harbor, a little southwestward of Jet d'Aval.

Depths.—The harbor dries 11 or 12 feet above the lowest tides, has from 10 to 15 feet water at high-water springs, and from 6 to 7 feet at neaps, but it is inaccessible during strong northwest or southwest winds on account of the heavy sea; in any case, since it can only be entered at high water—that is to say, when the stream is at its greatest speed in the Race of Alderney—the approach to it must always be difficult and often dangerous, and no vessel should attempt it without a pilot.

Tides.—It is high water, full and change, in Goury Harbor at 7h. 8m.; springs rise 22 feet, neaps 17¼ feet.

A lifeboat is stationed at Goury.

Cotentin Passage—Depths.—This passage is along the western coast of the peninsula of Cotentin and over the sandy flat which extends from the shore nearly the whole of the distance between Cape de Carteret and Granville. The least depth will be found at the two entrances; off Cape de Carteret, over the tail of the Bancs Feles, the least low-water depth nearing on the leading line is 8 feet. At the southern entrance between Pointe du Roc and the Admiralty Bank it is from 6 to 10 feet. At the spot indicated in the northern entrance there is a depth of 6¼ fathoms at high-water springs and 5 fathoms at neaps. In the southern entrance, owing to the greater range of tide, the depth is at least 7 fathoms at high-water springs and 5½ fathoms at neaps. Elsewhere the water in the channel is considerably deeper, but full of dangerous shoals on either side.

Coasters use this channel at all times of tide, but sailing vesesels of deep draft bound to Granville generally take the Deroute Channel, passing westward of Jersey and the Minquiers.

Winds between south and east are the most favorable for entering the passage from the southward and between north and east from the northward. In fine weather a vessel bound northward may run through it with the wind from south by east to southwest by south, and if bound southward with the wind from north by west to northwest by west; but it is imprudent to enter it from either direction with the wind blowing strongly between southwest by south and northwest by west or in thick weather.

Tidal streams, etc.—The streams in the Cotentin Passage run nearly parallel with the shore, their strength at springs being from 4 to 5 knots and from 2½ to 3 knots at neaps. In running through this passage from the northward it must be borne in mind that the southwestern stream begins to be felt in the Race of Alderney about an hour before high water at Dover, i. e., at half ebb by the shore at Cape de la Hague or about 4 hours after high water at Granville or St. Malo, and that even if the Race is passed through during the last of the northeastern stream it is quite impossible to reach Granville before low water in the passage.

Anchorage.—Several anchorages with fair shelter against easterly winds exist along this coast, but the leading marks should be carefully attended to; and in case of thick weather when these can not be descerned, vessels should anchor in such a depth as to allow for fall of tide, which, along this coast, is as much as from 30 to 37 feet at ordinary springs and from 14 to 20 feet at ordinary neaps, the rise and fall increasing as a vessel progresses southward. If waiting for water to cross the Feles Flats, anchorage may be found, as already described, in Vauville or Sciotot Bays or under Cape de Carteret. The best position at the latter place is in a depth of 4 or 5 fathoms, with the lighthouse just open westward of the fort on the western pitch of the cape, and distant about 2 miles. There is anchorage also farther south in Port Bail, St. Germain, and Regneville Roads, but these can be used by small vessels only, as the depth is not more than from 2½ to 3 fathoms in either at low water.

Directions.—**From the northward,** having passed through the Race, and having given the Nez de Jobourg a berth of at least 3 miles to avoid the Huquets de Jobourg, steer for Cape Flamanville, and from thence, as the vessel advances southward, keep the perpendicular point of the Nez well open westward of Cape Flamanville, so as to have Cape de la Hague Lighthouse also open of the Nez, which leads westward of the Basse Bihard, the outer patch of the Banc de Surtainville, and westward of the Roches du Rit.

When abreast of the latter, Port Bail and Gouey Churches come in sight southward of Cape de Carteret, then haul in gradually toward the land to avoid the Trois-Grunes and to shut in the northwestern peak of the high light-colored sand hills of Hatainville with the dark, bluff, and nearly perpendicular point of Cape de Carteret 350°, which is the fairway mark between the Bancs Feles and the coast, leading over the tail of these banks in from 7 to 12 feet at the lowest tides. If there is water enough to proceed, keep this leading mark on, passing 600 or 800 yards eastward of the red and black bell buoy marking the Jourdan Ridge, and westward of the foul ground off the Senequet Rock Lighthouse; but in passing this foul ground the vessel must haul to the westward a little and Hatainville sand hills must be again opened out.

Cape Flamanville in line with Cape de Carteret leads just clear southeastward of the tail of the Bancs Feles in deeper water than on the leading mark given, but if this latter mark is used, directly the banks have been passed the Hatainville Sand Hills should be brought on with Cape de Carteret as before. Rosel Point in sight westward of Cape de Carteret leads nearly midway between the Jourdan Ridge and the foul ground off the Senequet, but at this distance Rosel Point, having high land behind it, is not always well defined.

When passing the Senequet Rock, having hauled to the westward as described, steer to bring Champeaux Point in sight westward of Granville, bearing 160°, which, if the state of the tide and the vessel's draft admit, leads up to Pointe du Roc, inshore of the Catheue Banks; but as the vessel advances southward, if there is not sufficient water over the banks, look out for the remarkable trees on Mont Huchon, about 2 miles northward of Coutances, and do not bring them in line with Agon Church until the Etat and Huguenans Beacon turrets, Chausey, are in line bearing 175°. This mark leads westward of Catheue Banks, and when Coutances Cathedral comes on with Bec d'Agon or Agon Point, steer toward Granville, and, after passing the Canue Rock, keep the Etat well open northward of it until Mont St. Michel is within twice its width of Champeaux Point bearing 156°, or until Coutances Cathedral is in line with Mont Martin Church 40°, either of which marks lead eastward of the Admiralty Bank.

When Chausey Lighthouse, opening southward of the Iles des Huguenans, touches the Chapelle Rock 270°, haul up for it to avoid the Haguet Bank, or anchor if there is not sufficient water to enter Granville. As early as 2 hours' flood there will be 11 feet over the Catheue, the Founet, and the Haguet Banks.

French pilots generally proceed through the Cotentin Passage as follows:

By day run through Alderney Race if possible during the last of the northeastern stream; then, if the vessel's draft be not too great to pass without risk between the Bancs Feles and the land at low water, steer to the southward for Cape Flamanville, and passing it, bring Jobourg Church steeple in line with the extreme of the cape 355°; this mark kept very carefully on leads eastward of the Basse Bihard and of the Caillou Rock and over the Banc de Surtainville in not less than 3 fathoms. When the steeples of Port Bail and Gouey open of Cape de Carteret steer 139° so as to be about 2.5 miles from that cape when it is on with Cape Flamanville bearing 341°. From thence, Capes de Carteret and Flamanville in line lead between the Bancs Feles and the main and as far southward as the Senequet; but when abreast of St. Germain a vessel may steer in a little toward the shore and anchor northwestward of the Sac-de Pirou Rocks to avoid the strength of the northern stream; or if the wind is strong enough she can proceed, steering about 178° to pass midway between the Jourdan and the western extreme of the foul ground off the Senequet. In the case the Jourdan bell buoy should be out of position, a vessel will be certain of passing eastward of that shoal by keeping the Hatainville sand hills shut in by Cape de Carteret.

As soon as Coutances Cathedral is in line with Blainville Church, steer 209° between the Marie Ledge and the northern extreme of the Catheue Banks, and continue on this course until Agon Church tower is in line with Mont Huchon, or until the beacon turrets on the Huguenans and the Etat are made out; when, kept in line, they lead up in the fairway. If bound to Granville, run on with these beacon turrets in line until the Tombelaine Rock is well open of Champeaux Point 153°; keep it so, and after passing the Founet red bell buoy, steer for the harbor according to wind and tide. The last mark given is generally used by the pilots, as they consider it leads in the deepest water over the sandy bed northwestward of Granville and over the bar which unites Pointe du Roc with the Chausey Islets, and also clears the dangers eastward of these islets, as well as those surrounding Pointe du Roc.

At night, when through Alderney Race, and having given the Nez de Jobourg a berth of at least 3 miles, steer toward Cape Flamanville; as that cape is approached, keep Cape de la Hague Light opening and shutting in with the Nez 354°, which mark leads a safe distance westward of the Basse Bihard, but directly toward the Trois-Grunes. To avoid these latter, when Cape de Carteret Light bears 133° steer toward it on that bearing for 2 miles, when the vessel will be about 3.3 miles from the light and 1.5 miles from the northwestern edge of the Roches-du-Rit. From thence steer 175° until the light bears 68°, then 130° until it bears 341°, when keep it on that bearing and steer 161° past the southeastern end of the Bancs Feles, of which banks the vessel will be clear as soon as Port Bail leading lights are in line bearing 40°.

From this position, run 6 or 7 miles 170°, before which time Senequet Group occulting light will be well in sight, and by the aid of this light, with Cape de Carteret Light kept on a 347° bearing astern, the vessel may be navigated between the Jourdan Ridge and the foul ground off the Senequet. When Chausey Light is sighted, steer for it, bearing about 195°, between Basse le Marie and Catheue Banks until Granville Light bears 144°, when a vessel may either anchor to await daylight, or, if there is sufficient water, she may steer for Granville Light on that bearing, passing midway between the Founet Rock and Admiralty Bank on the starboard hand, and the Catheue Banks on the port hand, until within 1.5 or 2 miles of Pointe du Roc, when she should haul to the westward and open the pier head red light; which, steered for, leads up to the entrance.

Cotentin Passage from the southward.—Vessels from Granville bound to harbors eastward of Cape de la Hague or on the northern side of the English Channel, if their draft admits and with a leading wind, generally run through the Cotentin Passage. For this purpose Granville Harbor should be left directly the vessel floats, and as there is then plenty of water inside the Catheue Banks, when clear of the foul ground surrounding Pointe du Roc she may haul to the eastward until Champeaux Point is just open of Pointe du Roc, which mark should be kept on astern until Coutances Cathedral appears half way between Agon and Blainville Churches. Or, she may take the outer passage by keeping Tombelaine Islet a little open of Champeaux Point, which mark leads westward of the Catheue Banks and eastward of the Founet and other ledges of the Chausey Group until the Etat and Huguenans Beacon turrets are in line bearing 175°, which mark kept on astern is the only one which can be used with safety at low water, springs, and which leads in midchannel between the Catheue Banks and Basse le Marie. When Coutances Cathedral is in line with Agon Church tower, haul in toward the land, steering about 29° to pass between the Jourdan Ridge and the foul ground off the Senequet.

A good lookout should now be kept for the Jourdan red-and-black bell buoy, and when seen steer to pass a little eastward of it. If the weather is clear, Hatainville sand hills, shut in with Cape de Carteret 350° (when Cape Flamanville will be 6° open westward of Cape de Carteret), leads clear of the Jourdan and Bœuf Patch and up to the tail of the Bancs Feles.

If the weather should be hazy and Cape Flamanville not distinctly seen at this distance, from about 2 miles westward of Senequet Lighthouse steer 358°, taking care not to open Hatainville sand hills westward of Cape de Carteret. When abreast of St. Germain steer about north, to bring Capes de Carteret and Flamanville in line, before reaching the parallel of the entrance to Surville. These capes in line lead up to Cape de Carteret, but as soon as the steeple of St. Pierre-les-Moutiers is on with the slope of the eastern part of the hill of Cape de Carteret 18°, or when within about 2 miles of the cape, steer northwest until the Nez de Jobourg is 3° open westward of Cape Flamanville, or until Jobourg Church steeple is in line with the extreme of Cape Flamanville 355°, either of which marks, followed exactly, lead over the Banc de Surtainville in from 2 to 3 fathoms and up to an anchorage in Sciotot Bay. Should Vauville Bay be preferred, give Cape Flamanville a berth of 8 cables in rounding, to avoid the rocks and overfalls off it, and take up a berth according to the direction of the wind.

The southern stream begins to be felt off Cape Flamanville about 2½ hours later than in the southeastern entrance to the Cotentin Passage, whence it follows that a vessel in running through this passage 2 hours before high water at Granville and sailing at the rate of 6½ or 7 knots will at springs reach Cape Flamanville or the anchorage in Sciotot Bay before the southern stream makes. But at neaps this passage can rarely be accomplished in one tide by a sailing vessel, unless with a strong leading wind. The anchorage abreast of St. Germain should then be resorted to during the southern stream, and directly it slacks proceed under all sail, so as to reach the Race of Alderney, and take full advantage of the northeastern stream, which is of great assistance if bound eastward.

At night, leaving Granville and bound northward. steer with Granville Light on a 144° bearing midway between the Admiralty and Catheue Banks. When Chausey Light bears 194° keep it so, and steer 15° in the fairway between the Shamrock Knoll and Marie Ledge, and also between the Jourdan Ridge and the foul ground off the Senequet Rock, checking the vessel's position by cross bearings of Senequet and Granville Lights.

When well northward of the Senequet steer for Cape de Carteret Light, bearing 341°, until within about 1.5 miles of the cape, which round at this distance, passing about midway between it and the Trois-Grunes, and when the light opens southward of the hill haul to the northward, not bringing the light southward of 133°, to avoid the Basse Bihard, until Cape de la Hague Light is seen, which kept opening and shutting in with the Nez de Jobourg, bearing 354°, leads ½ mile outside the Basse Bihard and 1¼ miles westward of Cape Flamanville. If the wind is light a sailing vessel may now anchor in Vauville Bay until the northern stream makes.

CHAPTER VI.

CHANNEL ISLANDS—JERSEY, WITH ITS APPROACHES AND ADJACENT DANGERS.

General remarks.—A section of Jersey, if taken from north to south, would decline nearly in the form of a wedge, of which the highest part would be the northern shore, whereas a section of Guernsey would decline in a contrary direction, or from south to north; yet these distinguishing features do not immediately appear on sighting these islands from the westward. Seen from that direction, at a distance, both islands appear level, the lowland of Braye du Valle in Guernsey and that of St. Clement in Jersey being yet below the horizon. The outline of Guernsey, however, is somewhat more irregular than that of Jersey, and its western shore has more verdure and appears of a deeper shade than Jersey, whose western shores have suffered considerably from the encroachments of the sea sand; so much so that the color of the land between Corbiere and Etac Points is affected by it.

Both islands may be seen in clear weather from a distance of 20 to 25 miles. As they are approached from the westward, however, the northerly slope of the land in Guernsey, as contrasted with its southerly slope in Jersey, should prevent the possibility of either island being mistaken for the other.

Winds and weather.—The prevailing winds of the English Channel are those which affect the weather of the channel islands; local causes, however, produce certain modifications, and it may be useful to give the result of local observation and experience. Winds from southeast by south round by south to west by north are prevalent during the winter months, and the latter predominate; fortunately, against the severity of this wind both Jersey and Guernsey offer good shelter for shipping. During the summer months and equinoxes the winds are variable and uncertain.

When easterly winds set in during the winter season, they are thought to last longer and to blow with more uniformity in this neighborhood than elsewhere. Southerly and southwesterly winds during that period are almost always accompanied or followed by stormy weather, which seldom or never clears up until the wind veers to northwestward, as it usually does.

The weather in the vicinity of Alderney does not always correspond with that at Jersey and Guernsey, it being frequently local or peculiar to itself, owing, perhaps, to its proximity to the northwestern angle of the French coast at Cape de la Hague, or to the island being in the very vortex of the tides, which are there in a constant state of rotation, especially at new and full moon. At those times a difference of four points in the direction of the wind has been experienced, viz., an east-northeast wind at Guernsey and Serk, and a north-northeast wind at Alderney, both blowing at the same time, whilst the southwestern stream was running, lightly or moderately, in the neighborhood of the former, though near Alderney vessels were under double-reefed sails.

During the northeastern stream the wind has often been observed to be southwest at Alderney, while at Herm it was west by south, with similar variety in strength; and this without any difference in the barometer at the two places, or any perceptible cause, the attraction of the tides or deflection caused by the French coast line excepted. Southerly, southeasterly, northerly, and northeasterly winds also invariably blow from Alderney in strong irregular gusts, more particularly the first and last.

Gales from southwestward and northwestward send in the heaviest sea amongst the islands, to which the strength of the tidal streams greatly contributes; the worst period is from half flood to half ebb, after which the west-going stream keeps much of the sea out in the offing.

Refraction.—To show the variable effects of refraction caused by atmospheric conditions it may be noticed that from a station near Verclut guardhouse in Jersey the top of the southeastern battlement of Seymour Tower should exactly coincide with the line of the visible horizon at low water, equinoctial spring tides; sometimes, however, when viewed from this position, it has appeared considerably below that line, and in several instances above it. In this case the line of sight passes over the rocky surface of the Violet Bank, over the sandy strand in its vicinity, and over the sea beyond, being at a mean height of 64 feet above it. Similar variations in refraction have been observed on the French coast opposite, between the steeples of Coutances Cathedral and the summits of the trees in that neighborhood, and also in the vicinity of Cancale.

The approaches to the Channel islands present peculiar difficulties to the stranger. The outlying rocks fronting their coasts, the strength and ever-varying direction of the tidal stream, and the rough sea occasioned by it in bad weather, are all elements of danger; the mariner may, however, overcome these difficulties by careful study of the charts and attention to the sailing directions.

Soundings.—Near and between the Channel Islands there is nothing remarkable in the soundings, either in depth or quality of ground. to assist the mariner uncertain of his position. But for vessels approaching from the westward in thick weather it may be useful to note the following facts, viz, that a depth of 35 fathoms keeps a vessel in the offing outside or westward of the Roches-Douvres and Guernsey, that there is a depth of 33 fathoms between Guernsey and the Casquets close to the Casquet southwest bank, on which there is as little as 4 fathoms, and that, although small gravel knolls may be occasionally heaped up near Hurds Deep by the combined action of gales and tides, on which as little as 20 fathoms may have been found at times, such knolls, if and when they exist, may be easily distinguished from the large banks near and among the islands by their inferior size and by the greater surrounding depths.

An increase of depth from 40 to 50 or to 65 fathoms indicates a position northwestward of Guernsey, somewhere in the western part of Hurds Deep; and depths of from 70 to nearly 100 fathoms are obtained only northward of the Casquets and Alderney, in the eastern part of the Deep. The bottom of Hurds Deep is remarkable for large patches of black mud, although there is also much rocky ground and other substances. Between the Deep and the islands, and among them, the ground has no distinctive character, but consists of rock, gravel, granitic sand, and other coarse ground. Near the banks, however, and around their bases it is generally of fine sand.

Eastward of the Channel Islands, from Alderney down to Jersey, the soundings are a safe guide in approaching the French coast to within a reasonable distance. A line drawn from the eastern end of one to the other of these islands is nearly parallel with the French coast and distant from it about 9 miles. At the northern part of this line, near Alderney, the depth is 23 fathoms over clean ground, decreasing to 15 or 16 fathoms as Jersey is approached, with some deeper water, coarse rotten ground, and occasionally oyster beds. Eastward of this line the water shoals very gradually toward the French coast, and southward of Jersey the numerous reefs render all approach to that coast very hazardous.

Heavy gales cause considerable temporary alterations in the outlying sand banks and exposed beaches of the islands, southwesterly gales heaping up large quantities of sand and shingle and northeasterly gales washing them away again. It is well known that the Chateau and Ecreviere Banks, eastward of Jersey, vary in height as much as 6 feet from this cause; and it is probable, therefore, that the Banc de la Schole, the Casquet Banks, and others vary from similar causes.

All these variable banks, however, consist of fine sand and gravel, with sharp narrow ridges; they are not, therefore, very dangerous to shipping, except from the confused sea and tide ripples over them in bad weather.

Tidal streams.—Near Guernsey and northward of that island the true Channel stream prevails, the great body of the flood running about east-northeast whilst the tide is rising at Dover, and the ebb southwest by west when it is falling at that place; but near to and southeastward of the Roches-Douvres the flood stream begins to run southeast by east into the Gulf of St. Malo an hour after low water by the shore, and the ebb stream northwest by west out of it an hour after high water by the shore, the changes of stream in this vicinity being therefore near the time of half flood and half ebb at Dover.

Thus what is called tide and half tide prevails at Guernsey and among the islands to the northeastward, while at Jersey and along the southern shore of the Gulf, as well as westward near the Roches-Douvres, the stream is more regular, the former resulting from the direct action of the Channel stream, the latter from an interruption of the southern portion of that stream by the coast of France and its diversion into the Gulf of St. Malo.

The center of the Deroute Channel, between the Roches-Douvres and Guernsey, may be considered to mark the separating boundary of these two streams, for along this line and to the eastward they run side by side, blending and separating in varying direction and force, according to the state of the tide. It should also be noted that around and between the Channel Islands the streams change in direction by a rotary motion from right to left, the changes being apparently caused by the differences in the action of the two streams just described and by the peculiar form of the shores of the Gulf; that is to say, the direction of the stream makes a complete circuit of the compass in a little over 12 hours, or in the duration of an ebb and a flood tide. It is also worthy of remark that the action of the streams near the northern and southern parts of the Gulf are nearly the reverse of each other, there being slack water from Roches-Douvres eastward along the southern shores of the Gulf when the stream is running at its maximum rate northward of Cape de la Hague and Alderney, and vice versa.

While the water is falling at Dover and about the first quarter flood by the shore at Guernsey, the stream sets sharply into the gulf on both sides of the island and continues to run in southeastward until half flood by the shore and slack and change of stream in the offing, both of which occur almost simultaneously with low water at Dover. A division of the Deroute stream now takes place; the northern part sweeping northeast by east through the Deroute, Russel, Swinge, and Race Channels and then uniting with the eastgoing channel stream northward of Alderney; the southern part near the Roches-Douvres, setting into the gulf southeastward past Jersey and the Minquiers until near high water by the shore; after which, although the main body of the stream to the southward slacks, its northern border turns off northeastward past Jersey and then northward, rejoining the Deroute stream.

Close along the southern shore of the Gulf the ebb stream begins to run out westward soon after high water; farther out in the Channel, but within the Roches-Douvres, an hour later; at a position 8 miles northwest by west of the Roches-Douvres the stream changes at 2 hours ebb; and farther northward, near Guernsey, as already noticed, the slack and change of stream takes place soon after half ebb by the shore, at which time also the southwestern stream makes down through the Race, Swinge, and Russel Channels and through the Deroute Channel between the Pierres de Lecq or Pasternosters and Serk.

In the offing westward of Guernsey the stream seldom exceeds 3 knots until that island is approached, near which it sometimes attains the rate of 4½ knots. In the Russel Channels it exceeds 5 knots and it runs at about the same rate between Jersey and the Minquiers and nearly 4 knots in the center of the Deroute Channel between Jersey and Serk. The Race and Swinge Streams sometimes attain the rate of 7 knots or more. The average duration of the northeastern stream is 5¾ hours and of the southwestern stream 6¾ hours.

The rapidity with which the tides rise and fall and their velocity are greatly influenced by the wind, strong northeastern gales retarding and southwestern gales accelerating their progress in a very remarkable degree. Southwesterly gales also cause the Race Stream to run three-quarters of a hour longer northeastward than it otherwise would do, though northeasterly gales have not a similar effect upon the southwestern stream.

The tides put in and take off in all this neighborhood very suddenly, and the general run of springs takes place about half an hour earlier than neaps, the strength and direction of the wind making a difference of 2 or 3 feet in the rise and fall of the tide.

The general movement of the tidal streams is as follows: The streams are setting to the westward and southwestward at the time of high water at Dover and gradually work around through south and southeastward—that is, in a direction contrary to the hands of a watch—to their former set again. Slacks begin to the southward of Jersey at 1 to 2 hours after high water at Dover (or low water at St. Helier) and work up to the northward, making slack in Alderney Race at 5 hours after high water at Dover.

Slacks begin again to the southward at 4 to 5 hours before high water at Dover (high water at St. Helier) and work north, causing slacks in Alderney Race at 1 hour before high water at Dover. It will thus be seen that the slacks begin to the southward just after slacks are over in the race on both occasions, and that, roughly speaking, the slacks to the southward of Jersey correspond to local high and low water, while to the northward of Jersey they follow more nearly that of Dover and are in agreement with the movements of the main-channel streams.

One resultant of this peculiarity is that when it is slack in the southern part of the Gulf the streams are running most strongly in the northern portion, and vice versa, and close attention is therefore necessary to the consequent sudden changes, both in set and rate, of the streams when navigating in the Gulf.

Tides.—It is high water, full and change, at St. Helier, Jersey, at 6h. 25m., mean spring range 31½ feet; at Guernsey at 6h. 37m., mean spring range 26 feet; and, at Alderney, 6h. 46m., spring range 17¼ feet.

Caution.—In approaching the Channel Islands, constant and careful allowance should be made for the set of the tidal stream. If from the westward, and being southward of the parallel of Alderney, a southeasterly set may with certainty be expected, which will increase in intensity as Guernsey is neared, and between that island and the Roches-Douvres a considerable indraft is always found, especially with northwesterly gales.

Should a vessel happen to be near the islands during a long winter's night, but westward withal, the following observations are worth consideration. With northerly, northwesterly, or westerly winds, it is not prudent to lay her head northeastward between low and half flood unless the depth of water exceeds 34 fathoms, because at that time both wind and tide unite in driving the ship southeastward. With southerly, southwesterly, or westerly winds, it is equally imprudent to lay a vessel's head southeastward between half flood and high water, and, for a similar reason, both wind and tide then drive her northeastward.

With easterly winds the islands become a weather shore, and may consequently be made free with as occasion may require; and, by attention to the set of the streams, a position taken before dark may be preserved within 3 or 4 miles if a vessel can carry close-reefed topsails and foresail, what is lost on one tide being nearly regained on the other, if the wind enables her to lie across either. This calculation may be made with a fair degree of certainty off St. Malo, Granville, or Cape Flamanville.

When making the Casquets or any of the rocks or islands in thick, foggy weather, never run close home with the stream, but wait until the turn of the tide would set you offshore in the event of getting suddenly into danger.

In westerly gales avoid passing close to windward of any of the banks on a weather tide; and it is well to remember that at such times, with the western stream running in the offing, there is a very heavy sea westward of the islands, but comparatively smooth water within them and along the coast of France; so that a vessel leaving Alderney at 2 hours' ebb and pushing through the race before the southwest-by-west stream makes down may run a considerable distance toward Jersey in smooth water.

On entering or leaving any of the narrow channels between the islands be careful to make early allowance for the different sets of tidal stream sure to be met with at such places.

JERSEY, ITS APPROACHES AND ADJACENT DANGERS.

General remarks.—The form of Jersey is that of a parallelogram, its greatest length east by south and west by north being 9.3 miles and its breadth 5.8 miles. The middle of the island, in an east by south and west by north direction, presents a uniform level surface about 280 feet above the mean height of the sea, its northern shore being from 100 to 150 feet higher. Jersey thus, as already described, slopes to the southward, and to this circumstance may probably be attributed the preeminence it enjoys in the richness of its productions, its luxuriance, and the peculiar mildness of its climate. Granite and syenitic rocks are the principal formations.

The interior is well wooded, fertile, and intersected by deep and beautiful valleys running from south to north, through which numerous streams find their way to the low land on the southern coast, several occasionally uniting before discharging themselves into the sea.

Jersey possesses several good bays or roadsteads besides its artificial harbors. The best anchorages are in Gorey Roads on the eastern side of the island, and in St. Aubin Bay on its southern coast; in either of these, a well-found ship may ride out the heaviest gales from any quarter. The principal artificial harbor is that of St. Helier, the chief town of the island, at the eastern side of St. Aubin Bay. There are also smaller harbors at St. Aubin on the western side of the bay, at Gorey, at Rozel, and at other places, but they all dry at low water.

This island, like Guernsey and Alderney, is, for ecclesiastical purposes, in the diocese of Winchester. Each parish has its own church, the spires of which serve as the principal landmarks. The English language is much used, but the old Norman French is that chiefly spoken, the large number of French residents, as well as the employment of great numbers of French working people, especially during the potato season, tending to sustain the use of the French language.

The population of Jersey, according to the census of 1911, amounted to 51,898; of which number, about 28,000 form the inhabitants of St. Helier.

A great part of the island is laid out in orchards, but its chief export is potatoes, besides which grapes and tomatoes are exported in large quantities, as also are apples, vegetables, fruit, and flowers in great variety, together with granite, gravel, china stone, and coke. The principal imports are all description of manufactured goods, timber, coal, foodstuffs, dead meat, and large numbers of dairy cattle.

Telegraph cables.—The telegraph cable connecting Jersey with Guernsey, and thus with England, is landed a little eastward of Grosnez Point. That connecting Jersey with France is laid from Fliquet Bay to Pirou.

Radio station.—It is expected that a radio station will shortly be established on the north side of the island, probably at Ronez.

Pilots.—Belonging to St. Helier there are 10 pilots and 2 pilot boats; they cruise off the Corbiere Rock when the weather is suitable.

The following is extracted from the "Regulation on Pilotage," issued by the States of the island of Jersey April 4, 1905:

> Any pilot passing a vessel coming to the island without boarding her shall be liable to a penalty of £5 for each offense, unless such vessel has already a pilot on board or the master of her is a duly qualified pilot.
>
> Every pilot shall have a flag striped horizontally red and white, 6 feet long and 4 feet wide, which, on boarding a vessel and taking charge, he shall require the master thereof to hoist at the peak or where best seen as a signal that a pilot is on board, under the penalty of £5 against the master refusing to do so and of a like fine against the pilot who shall not be provided with such flag.
>
> A pilot undertaking the pilotage of a vessel shall, if required to do so, produce to the master or mate of such vessel his license or certificate, under a penalty not exceeding £1.
>
> If a vessel is boarded within the limits of the Corbiere or of Noirmont Point the pilots shall receive the full pilotage dues, provided the harbor master is satisfied that such vessel could not be boarded sooner and that the pilots were duly on duty.
>
> One of the pilot boats must always be in the vicinity of the Corbiere, or as near as possible thereto as the safety of the vessel will allow, unless she is short-handed, disabled, or compelled to return by stress of weather; if disabled, or if undermanned, a ball will be hoisted at the masthead.
>
> Vessels anchoring in the roads and leaving again without entering the harbor shall be liable to pay half the pilotage dues only.
>
> Every vessel is bound to take a pilot, with the exception of fishing boats and vessels of 40 tons burden and under. Masters of ships, being British subjects, may, nevertheless, exempt themselves from paying pilotage dues by passing the same examination as the pilots and obtaining the requisite certificate of competency; they are not, however, authorized to pilot any other vessel than that which they command and navigate. The distinctive flag (red and white, horizontal), is, however, to be hoisted at the peak so soon as a pilot is in sight.

Unless he shall have obtained the certificate mentioned above, the master of every vessel carrying passengers shall be bound, irrespective of the tonnage of such vessel, to hoist the signal for a pilot and to take one on board, under a penalty of about $100.

Pilots shall be bound, if the master require it, to take any ship or vessel 3 miles at least beyond the Corbiere.

The pilotage dues inward are 6 cents per ton from westward of the Corbiere, or at a distance of 3 miles southward of and not more eastward than the Corbiere; 4 cents per ton from between the Corbiere and Noirmont Point; and 2 cents per ton from between Noirmont Point and outside Elizabeth Castle.

The pilotage dues outward are at the rate of 1½ cents per ton, irrespective of distance taken.'

Aspect of Jersey.—The first objects distinguishable on approaching Jersey from the westward are the churches of St. Peter and St. Ouen, St. Ouen windmill with St. Peter's barracks, an extensive range of buildings on the sandy bights, and now and then the spire of St. Mary's Church, together with Princes Tower or Hougue Bie, appear among the trees in the interior of the island. St. Peter and St. Ouen Churches stand high; the spire of the former is lofty, the latter has only a pointed steeple. On a nearer view the lighthouse on the Corbiere Rock and then Rocco Fort and Tower, the three martello towers, square fort, and magazine on the sandy beach in St. Ouen Bay present themselves, as also the tower on l'Étac Point and the remarkable rock known as the Pinnacle, between that point and Grosnez Point; and finally, the declining land to the southeastward, with its well-wooded surface and its shore of sand and rock.

Jersey is encompassed by dangers rendered doubly formidable by the great rise and fall, as well as by the rapidity, of the tides. On the northwestern and western sides are the Banc Desormes, Rigdon Bank, and the shoals surrounding the Corbiere Rock; but the most remarkable are the Pierres de Lecq or Paternosters, the Drouilles, and the Ecrehos, on the northern and northeastern sides; the Violet Bank surrounding the southeastern angle: and the Minquiers Ledge, from 7 to 10 miles distant, with many other rocks, fronting the whole of its southern shores.

Plateau Des Minquiers.—For the description of this tangled mass of reefs, see Chap. V.

The descriptions of the other reefs and shores of the island commencing to the northwestward with the Banc Desormes, follow successively the western, southern, eastern, and northern coasts.

Banc Desormes, 3.7 miles 338° from Grosnez Point and the same distance from the highest of the Pierres de Lecq Rocks, is a bank of rocky ground 1 mile long 316° and 136° and 600 yards wide. The depths are generally from 12 to 15 fathoms, except near its extremes, where are two conical masses of rock, that on the northern end having 23 feet water, and that on the southern end 7½ fathoms. The latter bears from the former 136° 1,500 yards.

On the 23-foot rock, which is small and pointed, with depths of from 9 to 12 fathoms close around, the white semaphore house on La Moye is only just shut in behind the outer part of Pinnacle Point south, and the southwestern high rock of the Pierres de Lecq shut in with Belle Hougue Point, nearly to the outer part of its high bluff, bears 116°.

La Moye white semaphore house, just open westward of Rocco tower 158°, leads westward; Tour de Rozel, just shut in with Belle Hougue Point 111°, leads southward; and the Corbiere Rock Lighthouse, just in sight outside the Pinnacle 178°, leads eastward of the Banc Desormes.

Grosnez Point is the high precipitous bluff at the northwestern extreme of the island; from it St. Martins Point, Guernsey, the nearest point of that island, bears 312° 15 miles. On the summit of the point are the ruins of an old fort. From Grosnez Point the land trends eastward toward Plemont Point and the northern side of Jersey, and southwestward toward St. Ouen Bay; in this direction the coast continues high and rugged nearly as far as l'Etac Point, southward of which the high land recedes from the shore.

St. Ouen Bay is the indentation on the western coast of Jersey between l'Etac Point and the Corbiere. As already described, its shores are low and sandy, but quickly rising to the level of the plateau of the interior. Southward of St. Peters Barracks, standing conspicuously on the high land, is the Quenvais, an extensive district covered with sand and forming a remarkable feature on this coast.

Anchorage.—St. Ouen Bay affords good shelter in easterly winds, but no vessel should anchor in it with the wind from the westward. The greater part of the bay being rocky and foul, the anchorage is limited to a space about half a mile square near the southern part between the Great Bank and Rocco Tower; here a vessel is well sheltered from the tide, and may lie in a depth of about 7 fathoms, sandy bottom, with St. Ouen mill a little open northward of the square fort on the beach, between Nos. 2 and 3 towers, bearing 51°. The anchorage is easy of access and may be safely entered by large vessels without pilots.

An extensive reef, dry at low water, stretches off 1,400 yards westward of the Rocco Tower, and from thence extends alongshore southward in the direction of the Corbiere Rock, which it unites with Corbiere Point; the whole of this reef is covered before high water except a small rocky mass near the middle, of which the Flat and Sharp Rocks are the highest heads. Between the Rocco Tower and l'Etac there is a fine beach of white sand, but at low water it is fringed with rocks throughout, and off l'Etac Point it dries out 1,500 yards; the greater part covers before half flood and no part is visible at high water.

Rigdon Bank, of which the outer edge is nearly 2 miles westward of l'Etac Point, consists of rocky ridges, the interstices being filled up with sand and gravel; it is about a mile long 51° and 231° and 400 yards wide. The general depth is from 2½ to 5 fathoms, but two rocks have only 11 feet over them; of these one is near the middle, the other at the northeastern extreme. The bank is very steep-to on the outside, and between it and the Etac Reef is the Swashway Channel, about 600 yards wide, with a general depth of 6 fathoms; this channel is frequently used by vessels of from 200 to 300 tons.

Plemont and Grosnez Points in line 76° clears the north edge of Rigdon Bank. La Moye white semaphore house midway between Flat and Sharp Rocks 137°, or St. Peter's spire open southward of No. 2 martello tower 104°, clears it to the southwestward, and St. Peter's spire in transit with No. 1 martello tower 116° clears its eastern edge.

The best leading mark through the Swashway between Rigdon Bank and the Etac Reef is the highest heads of the Pierres de Lecq or Paternoster Rocks, about 6° open of Grosnez Bluff 44°.

West Rock, sometimes called Grey Bank, is 1.5 miles westward of Rigdon Bank; it is a mass of rock, very steep on the outside, about 300 yards in extent, on which the depth is from 6 to 10 fathoms. From its center St. Peter's spire a little open northward of the small square fort on the beach bears 99°, and the highest, or Great Rock, of the Pierres de Lecq is open 8° of Grosnez Bluff, which bluff and the Corbiere Rock subtend an angle of 72°. The shoal part is well marked near low water by a strong ripple.

The channel between West Rock and Rigdon Bank is more than a mile wide, quite clear, and has depths of from 12 to 17 fathoms.

Great Bank extends 310° nearly 1.7 miles from the Corbiere Rock and is 600 yards wide. It consists entirely of sand, and the depth upon it is generally from 7 to 9 fathoms, except at two spots, where there are narrow ridges of fine sand with as little as 5 or 5¼ fathoms. The outer ridge is at the northern extreme of the bank, close to deep water and is about 400 yards long 96° and 276°; its center bears 310° 1.5 miles from Corbiere Lighthouse. The inner ridge is similar to the outer, but only about half the length; its center bears 303° 1,800 yards from Corbiere Lighthouse. Between the ridges there is a good channel in to the anchorage ½ mile wide, with regular soundings of from 8 to 9 fathoms, sand.

St. Ouen mill, a third of the distance between No. 2 tower and the small square fort on the beach, 59°, touches the northern extreme of the Great Bank. The Jument, a whitewashed rock 700 yards eastward of the Corbiere, touching the inner side of the Corbiere 118° leads southwestward; and the Jument in line with the high-water rock midway between Corbiere Rock and point 139° leads northeastward. St. Ouen mill a little open northward of the square fort 51° leads over the bank, midway between the two shoal ridges, in a depth of 9 fathoms.

Corbiere Point, at the southwestern end of Jersey, is a low bluff with a flagstaff on the summit and two small houses at its side. Just within the point the land rises at a steep slope and unites with the high table-land of La Moye.

Corbiere Rock, 400 yards westward of the point and connected with it by a reef which dries after the last quarter ebb, is 70 feet above high water and very remarkable. It stands prominently out from the coast line and is the principal landmark for vessels approaching from the westward. On it is a lighthouse and a signal station which is in telephonic communication with St. Helier; it may be seen in clear weather 10 or 12 miles distant. From it the northwestern light buoy of the Minquiers Shoals bears about 195° 11.8 miles and Hanois Lighthouse 310° 23.5 miles.

Light.—From a circular stone lighthouse 62 feet high, on the Corbiere Rock, is exhibited at an elevation of 119 feet above high water a fixed white light with red sectors, visible 17 miles. It shows red over the Vracheres and the adjacent dangers.

Fog signal.—During fogs or thick weather a bell is sounded. An explosive signal is also fired near the base of the lighthouse. This latter signal may be sometimes given more frequently in answer to prearranged whistle signals with the mail steamers.

Caution.—Mariners must be very careful when navigating within the limits of either *red* sector.

The principal dangers off and near the Corbiere are the Green Rock, the Boiteaux, Boue, Frouquie, and Noirmontaise Rocks.

Green Rock, the outer danger, is covered by 11 feet water; it bears 282° 1,330 yards from Corbiere Lighthouse and lies 400 yards from the Boiteaux Rocks on the same line of bearing. The marks for it are St. Ouen Mill just eastward of No. 3 Martello Tower 40°, and the Jument Rock in line with La Moye Point 106°. Another rock, with only 8 feet water, lies 51° 200 yards from the Green Rock.

The Boiteaux are two rocks only 60 yards apart between the Green Rock and the Corbiere; they uncover 9 feet at the distance of 950 yards from the Corbiere. From the southern Boiteaux, St. Ouen Mill is in line with Frouquie Rock 37°, or St. Ouen Church is open southward of the magazine southward of No. 3 Martello Tower, and La Moye white semaphore house is in line with the northern side of the peak of the Corbiere Rock 98°.

The Boue Rock bears 296° 730 yards from Corbiere Lighthouse and uncovers 20 feet or, rather, before half ebb; it is at the inner part of the sunken reef inshore of the Boiteaux.

The Frouquie is at the outer edge of the reef extending from Rocco Tower and Fort to the Corbiere, from which latter it bears 340° ½ mile, and from the Boue Rock 28° 600 yards. The Frouquie covers 6 feet at high water springs.

Noirmontaise Reef lies 500 yards westward of the Corbiere and dries 4 feet at low water. Another reef 200 yards westward of the Corbiere has 4 feet only over its shoalest part, and a large rock 153° 200 yards from the Corbiere uncovers after the first quarter ebb.

Clearing marks.—St. Ouen windmill open northward of No. 3 Martello Tower leads outside and northward of the Green Rock and of all other rocks northwestward of the Corbiere, and La Moye white semaphore house in line with the southern side of Jument Rock leads 600 yards southward of the Green Rock and 100 yards southward of the Noirmontaise Reef.

The Frouquie Pass is between the Frouquie and Boue Rocks. The clearing marks for the outer and inner parts of the Great Bank are the best leading marks by which to enter this pass from the northward, for should both the Boue and Frouquie Rocks be covered, a vessel can not go too near the former so long as the Jument is in sight inside the Corbiere, nor can the Frouquie be touched without opening the Jument eastward of the high rock between Corbiere Point and Rock. There is a small rock 250 yards westward of the Frouquie with only 1 foot water; from it the Jument Rock and the western side of the high rock between Corbiere Point and rock are in line. With this exception, there is a clear 2½-fathom passage more than 200 yards wide; no vessel should, however, attempt to run through until half tide; that is to say, until the Boue Rock is nearly awash; it is then quite safe for vessels under 15 feet draft.

At or above half tide therefore enter the pass midway between the Frouquie and Boue Rocks, with the Jument midway between the Corbiere Rock and the large rock off Corbiere Point, and when St. Ouen Church steeple is on with the high rock mass southwestward of Rocco Tower 35°, steer for the Corbiere Rock until within 200 yards of it, when it must be rounded at a distance of 150 yards only; and run out to southward when the Pinnacle Rock is nearly in line with the outer part of the Corbiere.

There is a narrow deep-water channel between the Frouquie and the 1-foot patch, also between the Green Rock and the Boiteaux and between the Noirmontaise and Boue Rocks, close to the Corbiere and leading to the Frouquie Pass, but the space between the Boiteaux and Boue Rocks, and from the latter to within 200 yards of the

Corbiere, is so thickly studded with sunken rocks as to be very dangerous even for boats at low water and should be avoided.

Jument Rock, very useful as a seamark, has a large white patch painted on it. From it Corbiere Lighthouse bears 296° 700 yards, and it is 200 yards from the high bluff next eastward of Corbiere Point, with which bluff it is connected by a reef dry at low-water springs. About 100 yards outside the Jument is a dangerous rock, which dries only at the last-quarter ebb. It should not be approached therefore nearer than 600 yards.

La Moye Point is a high bold bluff 1 mile eastward of the Corbiere. On the highland behind the point is a conspicuous white (admiralty) semaphore station and small tower, often alluded to in this work and very useful as a seamark. The semaphore and telephone have been removed. The quarries at La Moye, showing at a distance as a white mark in the bluff, are also useful in clearing the Minquiers Reefs. La Moye Point is safe of approach from the westward, but 250 yards off it is a rock with only 6 feet water. Close eastward of this rock and probably connected with it are the Kaines, a dangerous rocky group, of which the highest covers only at the last quarter flood. The outer sunken rock of the Kaines lies 450 yards from the shore.

Corbiere Lighthouse, kept open southward of the Jument, 299°, until Tabor Chapel, St. Brelade Bay, opens out eastward of Grosse Tete, 39°, leads clear of all these dangers.

St. Brelade Bay, near the southwestern end of Jersey, between La Moye and Le Fret Points, is much contracted by the extensive reef fringing its eastern shore, and the anchorage is further cut up by the Fournier and Fourche Rocks. There is always less sea on the western than on the eastern side of the bay, but it is very inferior to St. Aubin Bay as an anchorage and more exposed to southerly gales; nevertheless small vessels, and even large open boats, anchored within it off Port Bouilly, have been known to ride out fresh gales from this the most exposed quarter, the holding ground being remarkably good.

Approaching St. Brelade Bay from the westward the most remarkable objects seen are Grosse Tete, the high square rock under the rugged land of La Moye on the western side of the bay and Noirmont Tower, painted with one white and two black horizontal bands, standing prominently out at the end of the low point of that name to the eastward. On opening out the eastern side of the bay clear of Grosse Tete the white sandy beach appears, and two martello towers, one on each side of Grouin Point, at the head of the bay. Beyond are villa residences and scattered groups of houses, while above all, on the high land near the middle of the bay, stands Tabor Chapel, a plain white building with slate roof forming the principal landmark in it.

Near the middle of the bay are the Fournier and Fourche Rocks, about 470 yards 274° and 94° from each other. The best anchorage is about 200 yards northeastward of the Fournier. The ground is quite clean up to the base of this rock, which is of very small extent. The Fournier dries 9 feet and the Fourche 10 feet of low-water springs.

The other, but less important, rocks of the bay are the Fournier du Havre, which dries 17 feet 570 yards northeastward of the Fournier; the Plat Houmet, which dries 11 feet in the bight nearer the shore; and the Rousse Rock, about 25 feet above high water level, with the Rousse-Frouquie just northward of it on the eastern side and outer part of the bay.

St. Brelade Bank is an uneven bed of rocks commencing ½ mile south of La Moye Point and extending eastward about 900 yards. The least water, 29 feet, is near the eastern end of the bank.

Le Fret Bank, 600 yards off Le Fret Point, is 250 yards in extent north and south, with from 25 to 29 feet water. Within 500 yards northwestward and westward of the bank are several rocks having a least depth of 14 feet on them, and at 400 yards southeastward of the bank is a patch with only 20 feet. The marks for the 14-foot (the southernmost) patch are the Corbiere Lighthouse and Jument in line 296°, Noirmont Tower 84°; and the western Martello Tower in St. Brelade Bay in line with Rousse-Frouquie 5°.

Corbiere Lighthouse in line with La Moye Point leads inshore of Le Fret Bank and of all these rocky patches; and Corbiere Lighthouse, a little southward of the Jument, leads southward of them, but over St. Brelade Bank.

Directions.—A vessel from the northwestward bound to St. Brelade or St. Aubin Bay, on nearing the shore of Jersey, should keep Plemont Point open of Grosnez Point until Corbiere Lighthouse bears eastward of 147° in order to clear the Rigdon Shoal. When St. Peter's spire opens southward of No. 2 martello tower she will be southward of the shoal, and from thence should steer to round the Corbiere, about a mile distant, avoiding the Green Rock and other offlying reefs by keeping St. Ouen windmill open northward of No. 3 martello tower in St. Ouen Bay until La Moye white semaphore house is on with Corbiere Lighthouse. To preserve a safe distance from all dangers in rounding the Corbiere, Jersey pilots keep the top of the highland of Jersey, eastward of the lighthouse, always showing above the base or lower window of the lighthouse. When the white house opens southward of the Jumet Rock 88°, or when the outer part of the high table-land within Noirmont Point is open of Le Fret Point, a vessel is clear of the Noirmontaise Reef and of all dangers southwestward of the Corbiere and may run for La Moye Point until Motte Islet, off Point le Croc, is just shut in behind Noirmont Point 98°, which mark leads between the Kaines off La Moye Point and St. Brelade Bank until Tabor Chapel is in line with or a little open of Battery Point 32°, which then becomes the leading mark through the western pass to the inner anchorage of St. Brelade. Tabor Chapel kept bearing 19° leads up to the inner anchorage eastward of the Fournier Rock.

Anchor within the Fournier Rock in a depth of from 4 to 5 fathoms, fine sand, on or between either of these lines, when La Moye Bluff comes in line with the outer part of Grosse Tete 264°. Large vessels may anchor outside the Fournier in 8½ fathoms, gravel, with the western pass leading mark on and the Jument Rock just shut in with La Moye Point. The anchorage in St. Brelade Bay is rarely used.

Portelet Bay, between Le Fret and Noirmont Point, is a bad anchorage; it is small and still further contracted by rocks extending westward from Noirmont Point, as well as from the center of the bay westward of Janvrin Tower, this together with the rapidity of the tidal stream across the entrance, renders it dangerous of approach even for vessels of the smallest size.

The danger is increased by Portelet Ledge, an isolated mass of rock 198° 500 yards from Janvrin Tower; from the shoalest spot of 2 feet on this ledge La Moye white semaphore house, over a remarkable sharp-peaked rock semidetached from Le Fret Point, bears 202°; and Noirmont Tower appears northward of the high part of Pierre au Poisson, which lies midway between that tower and the ledge. Noirmont Tower, southward of the Pierre ou Poisson, leads just southward of Portelet Ledge.

If compelled to anchor in Portelet Bay the best berth is in a depth of 4½ fathoms, sand, with La Moye Point just shut in with Le Fret Point, and Janvrin Tower 29°. In case of necessity a vessel may anchor outside and eastward of Portelet Ledge in 6 fathoms, with Corbiere Lighthouse nearly on with La Moye Point, Janvrin Tower 355°, and Elizabeth Castle, St. Helier, just open southward of Noirmont Tower.

St. Aubin Bay.—The whole of the anchorage in this fine bay, though surrounded by rocks, is free from foul ground and sheltered from all winds by those from southeast by south round by south to west by north, and partially so even from them. Southwesterly gales send in a heavy rolling sea between half flood and high water, but as the water falls the sea subsides, the rocks in the offing greatly contributing to break its force.

The town and harbor of St. Helier occupy the northeastern side of the bay, and the little town of St. Aubin, with its castle on a rock nearly 600 yards from the shore, is on the western side opposite St. Helier, their distance apart being about 2.5 miles. Both towns have stone pier harbors, St. Helier by far the larger and more important, where vessels lie aground at low water on soft, muddy sand; the tide at low water, springs, recedes ½ mile from St. Aubin Harbor. A strong mole or breakwater projects from the northern side of St. Aubin Castle, sheltering a pier within, where vessels frequently refit and unload, grounding, however, at low water.

Elizabeth Castle is built on a craggy rock on the eastern side of the bay fronting the harbors of St. Helier and about ¾ mile southwestward of the town; moles or breakwaters extend both northeastward and southward from it; the top of its high central tower or keep is 105 feet above high-water level. On the site of this castle formerly stood an Augustine monastery built in honor of St. Helier, a recluse, whose hermitage on the summit of a high rock, 300 yards southward of the castle, still exists.

Elizabeth and St. Aubin Castles are insulated every tide, but with their moles afford shelter, respectively, to the two harbors by breaking the swell which rolls into St. Aubin Bay during southwesterly gales.

There is a concrete causeway from Elizabeth Castle to the slip near the Grant Hotel at St. Helier, and while it may be crossed, at night a red light is shown from near the northwest angle of the fort.

St. Aubin Harbor.—Several rocks lie scattered southward and westward of St. Aubin Castle, most of which uncover at low water. The two largest and most conspicuous are the Grosse and the Platte, very close together and 350 yards from the castle; the Grosse is the highest and shows about the first quarter ebb; both rocks are marked by beacon poles. Another group of rocks lies 400 yards southward of the Grosse, the northeastern head drying 7 feet at low water. Haule House open eastward of St. Aubin Castle Breakwater leads eastward of these rocks, and eastward of this line the bottom is all fine sand.

The extremes of the southern arm of the harbor and of St. Aubin Castle Pier have large whitewashed marks.

Light.—A fixed light, showing red seaward and white in the direction of the land to the northward, is exhibited from a lamp-post on the extreme of the northern pier of St. Aubin Harbor; it is proposed to erect a lighthouse here.

Depths.—At half flood there is a depth of 8 feet inside St. Aubin Castle Pier, at which time the water begins to enter the harbor; in the entrance the depth is about 17 feet at high-water springs, and 8 feet at neaps. The passage westward of St. Aubin Castle is not passable even for boats until half flood.

The population of the little town of St. Aubin is about 1,000. There is direct communication between it and St. Helier by railway. The chief import is coal and the only export red gravel. No stock of coal is kept available for shipping, the Port of St. Helier being so near at hand. Water of first-rate quality may be procured from pumps on the quay of St. Aubin Harbor.

St. Helier, the chief town of Jersey, is built on low land open to the southward but overlooked and sheltered northward by a high semicircular plateau completely commanding it. The town is well built, and, as previously stated, contains about 28,000 inhabitants. It has a college and several churches, whose spires, together with Fort Regent on the eastern side of the town, are the most prominent objects from the sea; the Jesuits' observatory, with its iron latticework tower, is also very conspicuous. A large general hospital is available for seamen in case of accident or illness, and there is also a hospital for infectious diseases on West Mount.

An examination anchorage has been established in the outer part of St. Aubin Bay.

Quarantine is performed under the British regulations, and vessels lie in the large road, St. Aubin Bay, until granted pratique by the harbor authorities.

Cargoes of passengers from infected vessels, or from a port in which disease has prevailed, or with suspicion of infection, may not be landed at any port of the island, except St. Helier, St. Aubin, and Gorey, and only then with permission from the harbor master.

Infected vessels must discharge all water on board, except that used as ballast, the tanks containing which will be sealed by the medical inspector. Drinking water will be furnished by the harbors and piers committee.

The master of an infected vessel, before his arrival at a distance of 3 miles from the island, shall hoist the infected flag at the mainmast head by day, and at night, two large white lights vertical, which signals shall be kept up till the termination of the visit of the medical inspector.

Communication.—Steamers run daily between Jersey, Southampton, Weymouth, and Guernsey all the year round and weekly to London, Plymouth, Bristol, and St. Brieuc. During the summer, daily to Granville, St. Malo, and de Carteret, and in the winter biweekly to Granville and St. Malo. The principal part of the trade is carried on by steamers.

There is direct telegraphic communication with England and France, and a railway runs to Gorey eastward and to Corbiere Lighthouse westward from St. Helier.

St. Helier has a well-supplied market, where meat, poultry, fruit, and vegetables may be purchased at the same prices, if not cheaper, than in London. Fish is scare. The principal imports are dead meat, coal, wheat, flour, timber, cement, artificial manures, etc. The exports are Jersey cows, granite, red gravel, fruit, potatoes, tomatoes, etc.

St. Helier Harbors are on the northeastern side of St. Aubin Bay. The Inner Harbor is completely inclosed by the Outer Harbor constructed between the years 1840–1850. Both are alike in form, the Outer Harbor being, in fact, a repetition of the Inner on an extended scale. They are nearly rectangular, narrow in proportion to their length, with the entrances near their southwestern corners.

Depths, etc.—The Inner or Old Harbor is 1,875 feet in extreme length and the entrance is 160 feet wide. Inside, the breadth ranges from 300 feet at the southern to 200 feet at the northern end. It dries 11 feet at the entrance and 25 feet at its northern end and has 8 feet water at its entrance at half tide.

The Outer or New Harbor is 2,700 feet in length and the entrance is 150 feet in width. The narrowest breadth is 380 feet, between Albert Pier and the southern arm of the old harbor, but between the new north pier and Albert Pier it is 430 feet wide. The harbor has been dredged and there was in 1899 a depth of 9½ feet at low water in the entrance and from 9 to 11 feet in mid-channel to about 200 feet within the north pier end, above which the dredging is still in progress. The dredged portion is only 230 feet wide between the south end of the north pier and the low-water line off the Albert Pier.

There is a depth of 10 feet just inside both the Victoria and the Albert Pier heads at low-water springs, but the harbor dries 16 feet at its north end. The ground rises gradually from about halfway up, though there are steep banks near the dredged channel. The bottom is fine sand and mud throughout. It has 28 feet at the entrance at half tide, 46 feet at high-water springs, and about 33 feet at high water, mean neaps.

The deepest water in the entrance is close to the Albert Pierhead. With scant water, vessels should not get within 20 yards of the Victoria Pierhead, as a ledge of rock runs off it toward Albert Pier, which dies at low water.

A landing stage has been built at Victoria Pier, alongside which there is 9 feet at low-water springs. The depths at the quays vary at high-water neaps from being dry to 13 feet, except at four or five berths mostly used by mail steamers, which then have from 23 to 31 feet. Mail steamers up to 300 feet in length make use of the harbor.

New works have been carried out at the Albert Pier, commencing from the inner side of its south extreme. Walls are built with their foundations on the rock, and alongside all the southern part of Albert Pier there is a dredged depth of 11½ feet at low-water springs.

Coal can always be obtained, and is usually in stock to the amount of about 1,600 tons; it is kept in stores near the piers. Coal is placed on board vessels alongside the quays, where the available depth at high-water neaps is about 18 feet; but it must be borne in mind that, although from the great rise of tide the harbor is accessible at springs to vessels of 25 or 30 feet draft, and at neaps to those of about 15 feet, provided they do not exceed 300 feet in length, the berths at the Albert Pier are dry at low water. When the alterations in progress are completed, there will be six or seven berths in the harbor with 7 to 10 feet at low-water springs. There are two lighters belonging to the State available for shipment of coal in the road, if required.

Docks—Repairs, etc.—There is a graving or stone dock at St. Helier, which is 200 feet long and 30 feet wide, but the water comes into it at all tides, and at present it can scarcely be considered as a dock; it is now being lengthened and may possibly be made into a gridiron.

There are some facilities for ordinary repairs to machinery and to shipping generally, and a small steam tug is generally available. There are 11 steam crane, one of 10-tons capacity, and the others from 2 to 5 tons; also 4 hand cranes capable of lifting from 2 to 10 tons.

Water.—There is an excellent and unlimited supply of fresh water to be had, the waterworks company having placed mains and hydrants along the quays.

Storm signals are hoisted at Fort Regent signal staff.

A lifeboat and life-saving apparatus are stationed at St. Helier.

Fishermen.—There are about 500 fishermen in Jersey.

Lights.—The following lights are exhibited for the guidance of vessels bound to St. Helier:

Hermitage.—A fixed white light from the end of the Hermitage Breakwater, elevated 27 feet above high water, and visible 5 miles. The south extreme of the breakwater is painted black and white in vertical stripes.

Albert Pier.—A fixed green light from an iron post on the western angle of the Albert Pier, elevated 28 feet above high water, and a fixed red light at its inner end on the esplanade parapet wall at an elevation of 48 feet above high water, situated 23° 630 yards from the green light, and both visible 5 miles. These two lights in line lead through the middle of the Little Road, between the Oyster and Dog's Nest Rocks, and between the Cloches Rocks clear of all danger.

These lights in line also lead between the Hinguette Rock and Grune St. Michel, when they can be seen at that distance, care being taken to open them a little one way or the other to clear a rock in the fairway having only 7 feet at low-water springs, and lying 500 yards southwestward of the high head of the Hinguette. This passage is very intricate for strangers at low water.

As leading lights for the passage from the westward between the Oyster Rocks and the western Cloche Rock, a front light on a white iron framework, elevated 75 feet above high water, is placed close to the white patch in Greve d'Azette Bay; it is an occulting white light visible 14 miles. The rear light is situated 1 mile 66° from the front light; it is fixed white, shown from a white iron framework near St. Clements Church at an elevation of 130 feet above high water, and visible when bearing from 250°, through west and north, to 95°. These lights lead on the same line as the day leading mark, which leads over the Passage Rock; the lights therefore must not be brought in line until eastward of St. Brelade Bay unless rise of tide admits.

Harbor lights.—There are two fixed green lights at the south end of the old harbor, which in line bearing east, lead through the entrance into the outer harbor.

A gas lamp on the east side of Albert Pierhead shows a green light over the harbor.

A red light over a white light, shown from the flagstaff at Victoria Pierhead, prohibits entry to the harbor.

Demie de Pas Light.—See Index.

Tides.—It is high water, full and change, at St. Helier at 6h. 25m. Equinoctial springs rise in the entrance, which is 9 feet below the zero of soundings, 39 feet; ordinary springs 34½ feet; neaps 24 feet. The flood stream runs 3 knots and the ebb 2 knots in the entrance of the harbor. For a full description of the tidal streams off St. Helier Harbor and in St. Aubin Bay, see Index.

NOTE.—The times of high water and height of the tide morning and afternoon are given in the tide tables. It should be borne in mind that these heights may vary considerably, northeasterly winds decreasing the height by 2 or 3 feet and westerly winds raising it by as much.

The Dog's Nest Rock—Beacon.—This important mark, either for entering St. Aubin Bay or St. Helier from the westward, is near the outer extreme of the rocky ridge extending from Point de Pas, which forms the eastern boundary of St. Helier Little Road. It is nearly awash at high water, and its apex is marked by three white spots and is surmounted by a beacon consisting of an iron pole and ball.

The principal rocks fronting the harbor and around the Little Road of St. Helier, besides the Dog's Nest Rock, are the Cloches Rocks, the Oyster Rocks, Grune Moulet, the Platte, and the Sharp Rock.

Les Cloches are two sunken rocks immediately off the entrance to the Little Road. The western Cloche has 7 feet water on it and lies on the western side of the fairway, with Les Buts Beacon in line with the west extreme of Gros du Chateau Rock north, and the east extreme of the Roman Catholic cathedral in line with the north extreme of the white mark on Albert Pier 29°. The eastern rock, with 2 feet water over it, lies with Oyster Rock Beacon in line with the eastern summit of Gros du Chateau 334° and the watch house on Victoria Pier bearing 23°.

Several rocks, with depths of 7 feet, lie in a direct line between the western of Les Cloches and Platte Rock. The large patch midway between, about 130 yards in length, is named West Rock.

Oyster Rocks and Grune Moulet — Beacons. — These rocks occupy positions on either side of the entrance to the Little Road. They bear 108° and 288° about 450 yards from each other, and are each marked by a beacon; the former is surmounted by an iron disk. Both beacons are on a swivel supported by a counterpoise, and at low water, when unsupported by the sea, may be seen in any position from vertical to nearly horizontal. The Oyster Rock uncovers 13 feet and lies 209° 240 yards from the Hermitage Breakwater end. The Grune Moulet dries 13 feet.

When these rocks are awash there is a depth of 22 feet water between the Victoria and Albert Piers.

Platte Rock is within the entrance to the Little Road, 63° a little over 200 yards from the Oyster Rock Beacon. It dries 1 foot, and is only 70 yards from the present head of the Hermitage Breakwater, which may be eventually extended to this rock. Rocks, with 4 and 5 feet water over them, lie 60 yards both southward and eastward of Platte Rock. There is a small pole beacon on the Platte Rock, which, however, is covered and not visible at high water springs. There is no safe channel between the Oyster and Platte Rocks.

Sharp Rock dries 3 feet and lies 96° nearly 250 yards from the Platte. The channel into the Little Road lies between the Platte and Sharp Rocks, and has a depth of 20 feet at the lowest tides. In passing between these rocks, which is the narrowest part of the channel, the Platte may be cleared on its eastern side by keeping the spire of St. Mark's Church open eastward of the northern white patch on the outer end of Albert Pier; and Sharp Rock may be cleared on its western side by keeping the eastern end of Almorah Terrace open westward of the Albert Pier. A good mark through is with the cathedral spire between the two white marks on the outer end of Albert Pier.

Anchorage. — **Little Road** lies eastward of the Hermitage Breakwater, and is used chiefly by vessels waiting tide to enter the harbor, or during neaps in fine weather with offshore winds. No vessel is allowed to anchor in the Little Road, nor within the approaches to St. Helier Harbor, at any other place than that indicated by the harbormaster or by the regulations, nor in the channel way, except through stress of weather.

In entering the Oyster and Platte Rocks are left on the port hand, and the Grune Moulet and Sharp Rocks on the starboard hand; the depth is from 17 to 4 feet at low water, springs, but the anchorage is so contracted by rocks that vessels over 8 feet draft, if remaining beyond a tide should moor. At low water the Little Road is completely sheltered eastward by the piers and by the rocky barrier, entirely dry, extending from Point de Pas to the Dogs Nest Rock, and westward of the Hermitage Breakwater and the rocks extending to and 200 yards beyond the Oyster Rock Beacon.

The best anchorage is westward of Grande Mangeuse (beacon on northern end) in about 15 feet water, with Fort Elizabeth flagstaff in line with the summit of Southeast Rock, bearing 316°, and the northwest corner of the office for French steamers, on Albert Pier, midway between the spires of the Roman Catholic Cathedral and St. Mark's Church, bearing 30°. The available anchorage space is only about 250 yards wide and 400 yards in length, northeast and southwest, and is surrounded by dangerous rocks. *See also* Directions.

Dangers off St. Aubin Bay.—The principal dangers to be avoided in approaching St. Aubin Bay, in addition to the St. Brelade and Le Fret Banks, previously described, are on the western side the Vracheres, the Hubaut with its surrounding rocks, the Grunes, the Grunes Vaudin, the Sillette Rocks, the Fours, the Grunes aux Dardes, and Danger Rock; the Rouaudiere near the middle; and on the eastern side the Grunes St. Michel, the Hinguette, Tetards, and Demie de Pas; the Diamond Rock near the center of the bay, in line between the Noirmont Tower and the outer Hermitage Rocks; the Pignonet, Grunes du Port, and Junees along the western shore; the Baleine and other sunken rocks near the eastern shore off Elizabeth Castle; and the Cloches, already described, off the entrance to St. Helier Little Road.

Some of the passages between these rocks are extremely narrow, and all are dangerous, both from the rapidity of the tides and from the generally discolored state of the sea, preventing the rocks being seen, even when close to them. A stranger should not attempt to navigate these channels without a competent pilot.

The Vracheres, a rocky bank of small extent, is the outer or southwestern danger off St. Aubin Bay. The Frouquie, its highest head, with only 5 feet water, is at the southeastern extreme of the bank, with Princes Tower touching the western corner of Fort Regent 57°, the Jesuit's Observatory tower open southward of Elizabeth Castle flagstaff, and the western martello tower in St. Brelade Bay in line with the western head of Rousse-Frouquie 6°.

The Vraicquieres, Hubaut, Grande and Petite Grune, and Passage Rocks all lie between the Vracheres and Point Le Fret; the narrow channels separating these rocky banks should never be attempted. The Vraicquieres, with its northern head 341°, 900 yards from the shoalest head of the Vracheres, has 17 feet least water.

From the Hubaut, which dries 2 feet, the western martello tower of St. Brelade Bay in line with the western side of the Rousse Rock bears 4°, and the eastern end of Almorah Terrace, touching the inside part of Noirmont Tower, 54°.

From the Grand Grune, which dries 6 feet, Princes Tower is in line with Elizabeth Castle Hospital, a small red-tiled building between the highest part of the castle and its northeastern angle, and the western martello tower in St. Brelade Bay is a little open of the high-water extreme of Le Fret Point.

The Petite Grune has 10 feet on its shoalest part, from which the Jesuit's Observatory tower is in line with Noirmont Tower bearing 63°, and the western martello tower in St. Brelade Bay appears midway between Rousse Rock and Le Fret Point. The passage between the Petite Grune and Le Fret Bank is 500 yards wide.

The Passage Rock, of 14 feet, bears 272° ½ mile from the shoalest spot on the Petite Grune, and from it the Dogs Nest Rock Beacon is on with the white patch on the sea wall at Greve d'Azette (the light structure also being in line), 82°; this is also a leading mark for the western channel, but leads, as described, over the Passage Rock and very close inside all these dangers.

The eastern boundary of the above rocks is marked by Tabor Chapel in line with the high-water extreme of Le Fret Point.

Grunes Vaudin are an extensive cluster of rocks more than a mile 86° of Noirmont Point and a mile eastward of the Vracheres. The two highest rocks, the Grand Vaudin and the Southwest Rock, dry 5 feet near the middle of the bank, about northeast and southwest, 350 yards from each other; many other heads have only from 1 to 3 or 4 feet over them. From the Southwest Rock the gateway of St. Brelade Church is just in sight eastward of the Rousse Rock, and St. Mark's spire is a little open eastward of the southeastern part of Elizabeth Castle 44°. From the Southwest Rock a chain of dangerous sunken rocks extends 500 yards 276°, and also ½ mile in a 63° direction; the eastern part, called the Poches-a-Suie, is nearly detached from the Vaudin Bank and has on it as little as 4 feet.

The Sillette — Beacon. — This reef lies northeastward of the Grunes Vaudin and is separated from the Poches-a-Suie by a 6-fathom channel 300 yards in width. It is a small reef, about 300 yards wide, but the rocks generally are higher than any others in the neighborhood; its highest head, close to the eastern side of the reef, dries 12 feet and is marked by a beacon pole 23 feet high, surmounted by the letter S, painted white, from which the Jesuits' Observatory is in line with Hermitage Rock; the spire of St. Mark's Church touches the southeastern angle of Elizabeth Castle and Icho tower, off St. Clements Bay, is in line with the northern side of the Frouquie Rock bearing 94°. There is a sunken 4-foot rock about 200 yards northwestward of the Sillette Reef with 6 fathoms water between.

Grand and Petit Four.—These rocks lie between the Sillette and the shore. The Grand Four uncovers 3 feet; from it Noirmont Tower bears 9° and Nicolle Tower is its apparent breadth open southward of the white patch on the Dog's Nest Rock. The inner head of the Grand Four has 6 feet water and bears 333° 200 yards from the highest rock just described.

The Petit Four is a reef of sunken rocks 300 yards eastward of the Grand Four and nearly 600 yards in extent east and west. The highest rock is near the middle of the southwestern part of the bank; it dries only 1 foot; another rock 100 yards 130° just uncovers and a third, bearing 63° 300 yards from it, is barely awash at low-water springs; the latter is close to the eastern edge of the reef, and from it Fort Regent flagstaff is open northward of False Hermitage Rock and Mont Plaisir House, touching Pointe de But, bears 352°.

Grunes aux Dardes is a rocky bank, of which the shoalest part is 200 yards wide, about 400 yards eastward of the Sillette Beacon. From its highest head, which dries 5 feet near the northern part of the bank, St. Mark's Church, midway between the Hermitage and Close Rocks, bears 42° and Janvrin Tower, in line with the southwestern high-water extreme of Ile Percee, 315°.

Another rock dries 4 feet close to this on a 355° bearing, and a third dries 3 feet 100 yards 186° from it. A rock awash at low water bearing 141° 200 yards marks the limit of the bank in that direction; and 300 yards eastward of the highest rock is the Frouquie, a sunken rock entirely detached, on which the depth is only 5 feet.

Danger Rock, with 5 feet water, is the eastern rock of some sunken rocks southward of the Grunes aux Dardes and 850 yards distant from the highest head of that reef; from it the eastern end of Almorah Terrace is on with the northern side of the Hermitage and Janvrin Tower, open of the southwestern high-water mark of Ile Percee, bears 317°.

Ruaudiere Rock—Buoy.—The Ruaudiere Rock dries 4 feet; it is small and steep-to, except on its southeastern side, where a sunken ridge extends 100 yards. A red bell buoy with staff and cage marked "Ruaudiere" is moored close westward of the rock, and on the flood tide with westerly winds is only 5 or 6 fathoms from the rock itself.

It is proposed to establish thereon a light flashing every three seconds. This rock is exactly in the fairway off the middle of St. Aubin Bay and nearly 850 yards 170° from the Diamond Rock. From it Haule House open westward of St. Aubin Castle bears 330°, Icho Tower, touching the southern side of Tas de Pois or White Rock, bears 102°, and the Jesuit's Observatory is open south of the Hermitage.

Grunes St. Michel are two small reefs nearly north and south of each other and little more than 100 yards apart. The southern reef is about 200 yards in extent east and west, and the least water, 3 feet, is at the western end. The highest head of the northern group of rocks dries 5 feet. From it Ruaudiere Buoy bears 310° 1,050 yards, and St. Marks spire is in line with the northern white patch on the outer part of Albert Pier 30°.

Hinguette Reef, 400 yards southeastward of the Grunes St. Michel, is 500 yards long 18° and 198°, and most of its rocks dry at low-water springs. The highest, near the northern end, dries 11 feet. Another, 150 yards within the southwestern end, dries 5 feet. From the 11-foot rock the western end of Victoria College is in line with the Dog's Nest Beacon 33°, and La Moye white semaphore house is open southwestward of Noirmont Tower. From this rock the reef extends about 120 yards eastward and 450 yards 186°.

Note.—An endeavor is being made to reduce or remove the 11-foot rock by blasting.

The Tetards are 600 to 900 yards southward of the Hinguette Reef. They have only 2 feet water over their outer head, from which Seymour Tower, touching the northern side of the Frouquie, bears 81° and the western end of Almorah Terrace, open eastward of the Dog's Nest Rock, 9°.

Nine-feet Rock, nearly midway between the Tetards and Tas de Pois, is the shallowest of several rocky heads in this passage. From it Icho Tower is the apparent breadth of the Frouquie open northward of that rock. Fort Regent Signal Post is in line with the eastern side of the Crabiere Rock, and No. 2 Martello Tower, St. Aubin Bay, just open eastward of Gros du Chateau Rock, bears 333°.

Dangers in St. Aubin Bay.—The Ruaudiere Rock, as already described, lies in the fairway off the middle of St. Aubin Bay. The main channel to St. Helier Little Road from the southwestward is between the Ruaudiere and Grunes St. Michel; it is nearly 800 yards wide at this part, has an even bottom, and a depth of 6 fathoms. Steamers using the western passage should pass northward of the Ruaudiere on the line of the leading marks.

Diamond Rock, near the middle of St. Aubin Bay, has 8 feet water over it. From it Fort Regent flagstaff touching the northern side of Close Rock bears 61°, and Haule House midway between St.

Aubin Castle tower and the end of the breakwater extending from it 326°.

Pignonet, Grunes du Port, and **Junees** are the principal dangers off the western shore of St. Aubin Bay.

Pignonet Rock—Beacon.—The Pignonet uncovers 10 feet with Le Fret and Noirmont Points in line, distant 500 yards from the latter. It is marked by a beacon pole surmounted by the letter P, painted white, from which Haule House touching St. Aubin Harbor pierhead bears 350°, and St. Saviour's Church just open northward of St. Mark's spire 56°.

There are many rocks between the Pignonet and Noirmont Point, of which the most dangerous is southward of a line connecting the two. This rock is the same height as the Pignonet and lies with the outer apex of Le Fret Bluff in line with Noirmont Tower, 250 yards from the latter.

Grunes du Port is a rocky group nearly 200 yards long north and south. The southern rock is covered with 3 feet water and the northern head dries 6 feet; from this latter rock Pointe de But bears 326°, and Fort Regent flagstaff is in line with Elizabeth Castle flagstaff.

The Junees are a sunken rocky group 400 yards from the Grunes du Port. From the southern rock, covered with 2 feet water, Lower Blanc Pignon House just shut in with the detached eastern bastion of St. Aubin Castle bears 345°, and Fort Regent signal post is in line with the northeastern extreme of Elizabeth Castle.

Baleine Rock, with 2 feet water over it, the most important danger within the bay on its eastern side, lies between Gros du Chateau and the Diamond Rock. From it Gros du Chateau Rock bears 63° 570 yards; the Jesuit's observatory tower is seen just beyond the white patch under the red light at the inner end of Albert pier 57°, and the high head of Quereme is touching the end of Hermitage Breakwater.

Outer Rock, off Hermitage Reef, is covered with 7 feet water, and several similar small patches are in its vicinity. From it the outer extreme of Motte Islet, in line with the Oyster Rock Beacon, bears 105°, and the eastern end of Victoria Terrace is nearly touching the northern extreme of Elizabeth Castle.

Anchorage.—There is sufficient room for several vessels to lie at single anchor in St. Aubin Bay, but if moored the hawse should be open to the southwest at any time between September and March when the prevailing winds are from that quarter.

The best berth is within the Diamond Rock, in about 20 feet water, lowest springs, with St. Saviour's Church tower just open northward of St. Mark's spire and in line with the high rock between Gros du Chateau and the Vrachere, or Fort Regent signal post, seen over

Elizabeth Castle, in line with Gros du Chateau 67°, and Haule House on with the northern extreme of St. Aubin Castle Breakwater 323°. This position is 6° about 400 yards from the Diamond Rock.

Vessels wishing to lie nearer to St. Helier may anchor outside the Diamond Rock in a depth of 5 fathoms, with Haule House on the same bearing and with St. Mark's spire touching the southeastern Heritage Rock.

This last position should only be used in fine weather, but at the anchorage within the Diamond Rock vessels of 18 feet draft may ride out a heavy southerly gale in safety, being out of the strength of the tidal stream and the sea swell and sea being broken by the outlying rocks, especially when the water is below the level of half tide. During neap tides vessels of 22 feet draft may safely anchor inside the Diamond Rock, but for deeper vessels there is no safe anchorage on any part of the southern coast of Jersey in very bad weather.

Passages into St. Aubin Bay.—Nine passages lead into St. Aubin Bay, viz: The Northwest, Western, Southwest, Silette, Danger Rock, Middle, Hinguette, South, and Eastern.

In westerly gales the best time to pass through any of these channels is between first-quarter flood and high water. The first of the ebb or west-going stream throws up a very dangerous overfall off Noirmont Point, and when that stream has fairly made, overfalls, which continue with more or less intensity according to the height of the ocean swell and strength of the wind, extend across all the channels until the stream slacks.

Northwest Passage is only 350 yards wide at the narrowest part between Le Fret Point and the rocky bank of that name, which, however, in the shallowest spot near it has a depth of 14 feet at low water; the channel itself (200 yards in width) is safe and has nothing less than 7 fathoms in any part. Being the ordinary steamer route between Southampton, Guernsey, and St. Helier, it is more used than any of the other channels.

Directions.—Having rounded the Corbiere and having passed between La Moye Point and St. Brelade Bank by shutting in Motte Islet with Noirmont Point, and having Noirmont Tower bearing 98°, run direct for the tower until Corbiere Lighthouse is in line with La Moye Point 288°, which mark leads midway through the narrowest part of the channel off Le Fret Point in 8 fathoms. Continue on the same line until the lighthouse on the sea wall at Greve d'Azette is in line with the Dogs Nest Rock Beacon, or the leading light structures are in line, 82°; these marks lead nearly midway between Noirmont Point and the Grand and Petit Four Reefs, more than 200 yards northward of the Rouaudiere Rock, exactly midway between the Cloches and the 7-foot rock 200 yards outside the Oyster Rock Beacon, and up to the leading mark for entering the Little Road.

Western Passage, between the Hubaut Reefs and St. Brelade Bank, is about 550 yards wide at its narrowest part, between the Petite Grune and Le Fret Bank, where the depth is from 7 to 9 fathoms, but the Passage Rock, with only 14 feet, lies in the fairway of the entrance. It is, however, the most direct route to St. Aubin Bay and St. Helier Harbor from the westward, one leading mark only being required, but as the marks are not easily made out in hazy weather, the Northwest Passage is probably the best and safest.

Directions.—The leading mark is the lighthouse on the sea wall at Greve d'Azette and the Dogs Nest Beacon (or the light structures before mentioned) in line 82°. This line almost touches the northern side of the Passage Rock and passes only 100 yards northward of the Petite Grune; therefore in entering the channel from the westward to clear those reefs keep Greve d'Azette Lighthouse open northward of the Dogs Nest Beacon until Tabor Chapel is on with Le Fret Point, after which the lighthouse and beacon may be brought in line, and, as already described, they lead up to the entrance of the Little Road.

Noirmont Tower, in line with De Pas Tower 75°, also leads northward of Passage Rock, but to clear the 20-foot rock eastward of Le Fret Bank the Hermitage Rock should be opened clear of Noirmont Point before shutting in Tabor Chapel with Le Fret Point, and if all objects eastward and near the town are invisible while the land about Noirmont and La Moye are tolerably clear, which is often the case in fine weather, Noirmont Point may be approached to the distance of a cable; but in passing eastward of it do not shut in La Moye white semaphore house with Le Fret Point until St. Aubin Castle opens out; this clears the dangerous rock between and outside the line of Noirmont Tower and Pignonet Beacon. After passing Pignonet Beacon bring Noirmont Tower a little open northward of it, and when about 500 yards eastward of the beacon anchor until the weather clears.

At night this is the best passage, the direct channel through being marked by La Greve d'Azette and St. Clements leading lights, in line bearing 82°.

Southwest Passage is between the Vracheres and the Grunes Vaudin, eastward of the Grande Grune, and westward of the Grand Four. The narrowest part of the channel is between the 6-foot sunken rock at the northern part of the Grand Four and another rock with 20 feet water over it; these rocks bear from each other 265° and 85° and are 400 yards apart.

Directions.—Saumarez House, or the Firs, a yellow building about half way up the slope of the hill northeastward of St. Matthew's Church (painted white seaward), in line with Noirmont Tower 29° leads midway between the Frouquie of the Vrachere and the

Grunes Vaudin; enter the channel therefore on this line and run on it until the Greve d'Azette Lighthouse is in line with the Dog's Nest Beacon, when proceed as before directed.

As the first leading mark given leads very close past the western side of the Grand Four, it is recommended that on the flood vessels should run in on it only until Tabor Chapel is in line with the upper part of the slope of Le Fort Bluff, and then use that as the leading mark until the eastern landing mark comes on.

Tabor Chapel is here given as the most conspicuous mark, but this leading line approaches the Grande'Grune rather nearer than is desirable; for the middle of the channel, Tabor Chapel should be shut in altogether and the Pic-nic Hotel, a house with a white gable on the low land westward of the chapel, should be brought in line with the extreme of Point Le Fret.

As there are overfalls and strong eddies from the rocks in this channel on both ebb and flood it should be avoided except in fine weather.

Sillette Passage, between the Sillette Rocks and the Grunes aux Dardes, is less than 400 yards wide, with an average depth of 6 fathoms; but a rocky patch of 26 feet lies in the fairway, so that no more than this depth can be depended on.

Directions.—The Sillette Passage should only be attempted by a sailing vessel with a fresh leading wind, as both tidal streams set right across it. The leading mark is No. 3 white martello tower in St. Aubin Bay in line with the eastern side of Grosse Rock, on which there is a beacon, 0° E. This leads 250 yards eastward of the Poches-a-Suie Rocks, on which there is a depth of only 4 feet, midway between the Sillette and Grunes aux Dardes, 200 yards eastward of the Petit Four, 300 yards eastward of the Pignonet Beacon, 100 yards westward of the Grunes du Port, and very close inside the western head of the Junees.

Middle Passage.—In entering by this passage, Danger Rock and the Grunes aux Dardes are left on the port hand and the Tetards, Hinguette Reef, and Grunes St. Michel on the starboard hand. The narrowest part would be 1,100 yards wide but for two sunken rocks, with only 14 and 15 feet over them, southward of the Grunes St. Michel and distant from it nearly ½ mile, thus dividing the channel into two. The westernmost of these two rocks has 15 feet water and is near the middle of the channel at its entrance. It bears from Danger Rock 94° 850 yards. The best channel is between Danger Rock and this 15-foot rock; here the ground is clean and the soundings regular in about 7 fathoms. The eastern side of the Middle Passage is rocky and the depths irregular.

Directions.—Mount Plaisir House, in line with the tower of St. Aubin Castle 338°, leads through the Middle Passage, passing 270 yards westward of the 15-foot rock, 500 yards eastward of Danger Rock, and rather less from the Frouquie of the Grunes aux Dardes, on which the depth is 5 feet, 350 yards westward of the Ruaudiere buoy, 250 yards eastward of the Grunes du Port, and eastward of but very close to the Junees sunken rocks.

To clear the Diamond Rock when anchoring in St. Aubin Bay, haul to the eastward when the eastern end of Almorah Terrace comes in line with the Vrachere, which rock is marked by a beacon and is the innermost high rock northward of Elizabeth Castle, and anchor as convenient when Haule House opens eastward of St. Aubin Castle tower.

Danger Rock Passage is between the Grunes aux Dardes and Danger Rock and is at this part 600 yards wide with 5½ fathoms water near the middle, but two rocky patches of 16 and 17 feet lie close southeastward of the leading line. This passage, like the Sillette, is dangerous at times for sailing vessels and should not be taken without a pilot. Steamers, however, whose captains are acquainted with the pilotage, use it as the most direct passage to the Little Road from the southwestward.

Directions.—Bring St. Mark's spire in line with the southeastern rock off the Hermitage 37°; this mark, which is not distinct to a stranger, leads nearly 300 yards southward of the southernmost rock of the Grunes aux Dardes, awash at low water and rather farther from Danger Rock; it also passes more than 300 yards clear of the outer 7-foot rock of the Ruaudiere and may be followed until the Dog's Nest Beacon is in line with the lighthouse on the sea wall in Greve d'Azette. The Jesuits' Observatory over the end or just open of the Hermitage Breakwater 43°, is a good mark and can be more readily made out.

Hinguette Passage, between the Hinguette Reef and the Tetards, is 700 yards wide, has 7 or 8 fathoms water, and is a good and safe passage at slack water, but at other times requires careful allowance for the tide, which sets right across it.

Directions.—Enter this passage with St. Mark's spire in line with the Dog's Nest Beacon 19° and run through between the Hinguette Reef and the Tetards; when St. Matthew's Church comes on with the Gros du Chatau Rock 343° steer in that direction, which line leads between the Cloches Rocks at the entrance of the Little Road.

South Passage is between the Tetards, with only 2 feet water, and some rocky patches to the eastward, on which the shoalest spot has 14 feet. The channel is 400 yards wide, has 8 fathoms water, but is not so safe as the Hinguette or as the Eastern Passage.

Directions.—St. Matthew's Church tower, painted white seaward, seen between the heads of the Gros du Chateau Rock 343°, leads through about mid-channel and between the Cloches up to the entrance of the Little Road; but if proceeding to the anchorage in St. Aubin Bay, when St. Peter's spire is in line with Lower Blanc Pignon House, 324°, painted white, steer with that as the leading mark up to the anchorage.

Near low water St. Peter's spire may be lost sight of before arriving at the anchorage, in which case care must be taken to note some other object in the line of direction.

Eastern Passage.—The narrowest part of this passage is between a rock with 11 feet water and Demie de Pas, which dries 20 feet and on which is a granite beacon 41 feet high, painted red and marked Demie de Pas, from which a fixed red light is shown. The 11-foot rock bears 268° 600 yards from Demie de Pas Beacon, and from it the 9-foot rock bears 327° 200 yards. The ground outside Demie de Pas is clean up to the foot of the rock, which is not more than 40 yards from the beacon.

Directions.—Approaching from the eastward, run in with La Moye White Semaphore House open of Le Fret Bluff 292° until the Frouquie Rock is abaft the beam; then haul up to pass within 200 yards of Demie de Pas Beacon, and when it bears 102° steer about 310° until St. Matthew's Church tower is between the heads of Gros du Chateau Rock, the leading mark for the South Passage. This leads up to the entrance of the Little Road, or, St. Peter's spire in line with Lower Blanc Pignon House leads up to the anchorage in St. Aubin Bay.

St. Helier Little Road—Directions—From St. Aubin Bay or from the westward.—When bound from St. Aubin Bay into the Little Road it is best to weigh at about half flood, at which time the depths at St. Helier are as stated at page 261. The channel is between the western Cloche Rock, with 7 feet water, and the outer Oyster Rock, with 7 feet. It is 250 yards wide and has from 4½ to 5 fathoms water. Steer between the Oyster Rock and the western Cloche Rock, with the Greve d'Azette Lighthouse and the Dog's Nest Beacon in line (both light structures also being in line), until St. Mark's spire is in line with the white patch at the Albert Pierhead 28°, or the cathedral spire between the two white patches at Albert Pier end, which marks lead into the Little Road, but after passing the Platte Rock edge to the northward until St. Mark's spire is in line with the northern white patch on the Albert Pier, which, as already described, leads either to the anchorage in the Little Road or up to the entrance of the harbor.

From the southward.—Pass between the Cloches Rocks with St. Mark's spire in line with Victoria Pier watch house 28°, or with the elbow and inner lights on Albert Pier (green and red) in line 23° (which is the best mark), and when nearing the Oyster Rocks proceed by the marks just given for the Little Road or for the harbor entrance, as may be required.

From St. Aubin Bay over the bridge to the Little Road or St. Helier Harbor.—This passage is only fit for small craft at high water; in taking it, steer to pass 100 yards northward of the Vrachere Rock, or run in with St. Mark's spire on with the northern side of the hospital until De Pas Tower opens northward of the northern white patch on the outer end of Albert Pier, with which mark run over the bridge (this part has only 1 foot water at half tide), and either enter the harbor or haul out into the Little Road.

By night.—Bring the green light and inner red light on Albert Pier in line bearing 23°, which mark leads between the Hinguette Rock and Grunes St. Michel up to the anchorage in the Little Road, or to the entrance of the harbor, care being taken to observe the precautions named at page 264.

If approaching St. Helier from the westward, after rounding the Corbiere, the leading lights of St. Clements and La Greve d'Azette should be brought in line, bearing 82° before the Corbiere Light changes to red; they should then be steered for until the green and red lights on Albert Pier are in line, bearing 23°, which line should then be followed until the vessel is off the harbor entrance. Hence, the two green lights on the south end of the old harbor in line, bearing 84°, will lead through between the pierheads. It must be remembered that when about abreast of St. Brelade Bay the La Greve d'Azette and St. Clements Lights in line lead over the Passage Rock, upon which there is only 14 feet at low-water springs.

If making the place from the southward and eastward, the Corbiere Light must be kept showing red until the red and green lights on Albert Pier are in line, when proceed as before directed. No stranger should attempt these channels at or near low water without a pilot.

NOTE.—Great care should be taken in altering the course from the line of La Greve d'Azette and St. Clements Lights in one to the line of the Albert Pier Lights, as the channel there is narrow; and this caution is especially necessary during the flood tide, as a vessel may run too far to the eastward and so get among the dangers on that side of the passage.

Signals.—The following signals are made from either the Albert or the Victoria pierhead flagstaffs:

A black ball at yardarm: No vessel drawing more than 13 feet is to enter without previous permission from the harbor master. This signal should be exhibited before the vessel has reached the Oyster Rocks.

A square red flag at top of flagstaff: No vessel must attempt to enter the harbor; all ships are to keep out of the way of those leaving.

A triangular red flag at yardarm: No vessel must proceed out of harbor or cast loose from the quay during the time this signal is flying.

When one or more vessels are on the point of entering or leaving the harbor at the same time, the house flag of the ship which is to come in or leave first will be placed above the red flag, as occasion requires.

By night a red light shown harborward from near the flagstaff: No vessel must proceed out of harbor during the time this signal is flying.

A red light shown seaward from near the flagstaff: No vessel must attempt to enter the harbor; all ships are to keep out of the way of those leaving.

In consequence of operations in blasting and removing submerged rock in the approach to St. Helier Harbor, all vessels are cautioned to exercise the greatest care to keep well clear of barges or other plant, and their moorings in connection with these works.

At certain times when the work is being carried on and entry or exit is prohibited, the following signals are made from the yardarm of Victoria or Albert pierhead flagstaff: By day, a square red flag; by night, a red light over a white light.

The barges at their moorings will show: By day, three black balls vertical; by night, three red lights vertical.

Caution.—In entering the harbor allowance must be made for the tide, which, at or near springs, runs in and out with considerable strength. The most dangerous time for a vessel to enter is at about half flood; at that time vessels are frequently forced over against the sand bank fronting the south pier of the old harbor before they have time to turn their heads up the harbor.

General directions.—In beating along the southern coast of Jersey it should always be borne in mind that the available space between the outer shoals off Noirmont Point and the Minquiers Ledge is but 8 miles, and between the Violet Bank and the Minquiers only 6.5 miles. Small vessels working up toward the narrows of the western channels, when eastward of the Kaines, may stand into St. Brelade Bay until the Jument Rock is in line with La Moye Point, and southward until the southern extreme of Elizabeth Castle is in line with Noirmont Point. When in the narrows of the western channel before half flood or after half ebb, backing and filling is recommended with a beating wind; with the eastgoing stream the vessel's head should be offshore and with the westgoing stream inshore. Between half flood and high water a vessel may act according to her draft, for at half tide there is a depth of at least 13 feet over all the rocks in the offing of St. Aubin Bay, with the exception of the Pignonet, Hinguette, and Sillette, on which the depths then are only 9, 8, and 7 feet, respectively.

If bound to the Little Road or to St. Helier Harbor, it may be useful to know that St. Mark's spire touching the southern side of Close Rock leads 60 yards northward of the Rouaudiere; St. Mark's church spire is close to the Cathedral spire, which is much higher and must not be confused with it.

A vessel from the northwestward running for shelter in St. Aubin Bay during a gale from that quarter should keep 1.5 miles outside the Corbiere to avoid the breaking sea near it, especially between half ebb and low water, and when the land of Noirmont is well open steer for its point until Grosnez Point comes on with the Corbiere, when haul up for La Moye and bring the marks for the northwest passage in line, where much less sea will be found than in either of the other channels.

In heavy westerly gales the whole space between the outlying rocks off Noirmont Point is a confused mass of breakers; clouds of driving spray create an impenetrable mist, obscuring all marks near the level of the sea, and the beacons marking rocks are all out of sight, but even under such circumstances the northwest passage may be safely taken by those acquainted with it, as both Le Fret and Noirmont Points are safe of approach for large vessels to the distance of 200 yards.

On arriving abreast of Noirmont Point attend to the directions given at page 271, or do not shut in La Moye white semaphore house with Le Fret Point until No. 3 white martello tower in St. Aubin Bay opens eastward of St. Aubin Castle to clear the Pignonet Rocks, as the first of the flood sets right over these rocks into St. Aubin Bay. It may be useful to repeat that when Haule House comes on with the western end of the wall extending westward from St. Aubin Castle the vessel is midway between the Grunes du Port and the Diamond Rock, and that St. Saviour's Church tower, just open northward of St. Mark's spire and in line with the high rock between Gros due Chateau and the Vrachere Rock Beacon 56° leads up to the anchorage in St. Aubin Bay well clear of the Diamond Rock.

Approaching from the westward the Frouquie Rock, off Le Croc Point, in line with Seymour tower 81°, leads outside all the shoals off Noirmont Point and St. Aubin Bay until near the Tetards, when the tower should be brought nearly on with the Rousse Rock just northward of the Icho Tower. From the eastward La Moye white semaphore house open of Le Fret Bluff 306° leads outside all the rocks off St. Clements Bay, and of the Frouquie and Demie de Pas up to the entrance of the Eastern Passage.

The coast eastward of St. Helier is low and sandy to La Roque Point, the southeastern extreme of Jersey, distant 5.5 miles 91° from Noirmont Point, and also northward of La Roque Point as far as Mont Orgueil Bluff, which bears from La Roque Point 12° 2 miles, the bight between them being named Grouville Bay, off which, at 1 mile southeast from Mont Orgueil Castle, is good anchorage for vessels of the largest size. The southern part of this coast is inaccessible to shipping, it being fringed by extensive reefs which dry in some parts around La Roque Point 2 miles from the shore at low-water springs.

The outer edge of these reefs on the southern side is generally steep-to and, fortunately, well marked by a number of large rocks, which, although sometimes nearly awash at high water, are never entirely covered, and also by three stone towers, viz, the Demie de Pas Tower, 1.5 miles south of Victoria Pier, St. Helier; the Icho Tower, about 3 miles southeastward of the Little Road of St. Helier; and Seymour Tower, off La Roque Point, 1.8 miles farther eastward and near the middle of the Violet Bank.

Violet Bank is the general name applied to the southeastern part of the great reefs eastward of St. Helier. The part which dries at low water springs extends rather more than 2 miles from La Roque Point and consists of gravel, shingle, and sand, interspersed with numerous ledges of sharp-pointed rocks. Beyond this to the eastward the bank extends 1.5 miles beyond the Conchiere Rock, with many sunken reefs, included in the description of the Violet Channel. The greater part of the bank covers at half flood, at which time there is a foot of water over the inner part of the ridge of sand and shingle extending from La Roque Point to Seymour Tower; this, the lowest part of the ridge, is near La Roque Point and is the most favorable spot for the passage of boats. At high water the drying part of the bank is entirely covered and is then only marked by the Conchiere Rock at its southern extreme, by Seymour Tower near the middle, by Karame Rock, at this time awash, on the southeast, and by Little Seymour Rock, also awash but marked by a pole and basket beacon, near its eastern side.

Tidal stream.—From half flood to half ebb the stream runs with a velocity of 6 knots, at springs, over the Violet Bank and through the Violet Channel in a northeasterly direction, turning northward through Gorey Roads, where its strength is about 4½ knots.

As before remarked, the reef eastward of St. Helier, as well as the southern edge of the Violet Bank, is well marked by conspicuous rocks which, together with the principal sunken dangers along this line, will now be described.

Tas de Pois, or White Rock, bears 144° 1,500 yards from the Dog's Nest Beacon. Although only 5 feet above high water springs, it is very remarkable from its upper part being well whitewashed all around, and from there being another rock, rather larger and black, 300 yards eastward of it. Dangerous rocks, which never show, extend 330 yards westward of it, and 500 yards northwestward is a rocky group, of which the Trois Grunes, the highest heads, uncover 20 feet. A chain of rather high rocks extends from the White Rock to the shore.

Demie de Pas—Beacon.—This is the westernmost rock of a cluster bearing 167° 800 yards from the White Rock, and 274° 1,050 yards from the Frouquie; it dries 20 feet and is steep-to outside. Upon the rock there is a granite beacon 41 feet high, painted red, and marked "Demie de Pas" in white letters; it stands about 20 feet above high water.

Light.—From the top of Demie de Pas Beacon a fixed red light is exhibited at an elevation of 26 feet above high water, visible 6 miles.

The Frouquie, 125° 1,500 yards from White Rock, is 3 feet lower than that rock and therefore nearly awash at high water springs. A dangerous reef extends 231° 500 yards from the Frouquie and a chain of high rocks connects it with Point Le Croc, of which the inner and highest is Motte Islet, about 22 feet above the level of the highest tides; La Sambue, another rock in the same chain, being only 2 feet lower. This line of rocks marks the limit of the Greve d'Azette, the first bay eastward of St. Helier.

La Moye white semaphore house, open of Le Fret Point 292°, leads 400 yards southwestward of the Demie de Pas and of the rocks extending from the Frouquie.

The coast between Motte Islet and La Roque Point recedes slightly and forms St. Clements Bay. Between the Frouquie and Icho Tower no rocks are visible at high water to mark the outer edge of the reef fronting this bay, but at half tide and less it is well marked by the Rouget Rock, which is close to the edge of deep water and bears 118° 1,300 yards from the Frouquie; also, by the Jinquet, which dries 25 feet ½ mile 94° from the Rouget; and 600 yards eastward of the Jinquet Rock is the Grande Frouquie, which bears 234° 600 yards from the Icho Tower and is 7 or 8 feet above the level of the highest tides.

Icho and Seymour Towers are built of stone, are each about 45 feet above the level of high water, bear from each other 70° and 250°, and are 1.8 miles apart. Icho Tower (round, with its upper half whitewashed) is surrounded by high rocks, and in this respect differs from Seymour Tower, which at high water rises abruptly from the sea and is completely isolated.

Echiquelez Rock is one of the principal seamarks near Icho Tower, from which it bears 153° 930 yards. Its summit is 5 feet above the highest tides; it is steep-to on the outside westward, but 136° 300 yards from it is a half-tide rock; and northwestward, in line between it and the Jinquet, are several dangerous rocks, of which the farthest dries 5 feet and lies 300 yards 186° from the Grande Frouquie.

Between Echiquelez Rock and the Conchiere the edge of the reef curves outward 450 yards beyond a straight line connecting those rocks.

Icho Bank is a dangerous rocky, irregular, off-lying ridge nearly 1,200 yards long 288° and 108°, and 300 yards wide; the least water, 2½ fathoms, is at the northern extreme, and bears 212° 2.3 miles from the Icho Tower. From this shoal spot Plat Roque Martello Tower is just clear northward of Icho Tower, and St. Peter's spire, open eastward of Lower Blanc Pignon House, bears 323°. On other parts of the bank there is a depth of from 3 to 5 fathoms.

The channel between this bank and the rocks fronting Icho Tower is 1.8 miles wide and clear of danger.

The Conchiere Rock, 2 miles from La Roque Point and at the southern extreme of the Violet Bank, dries 41 feet, and is therefore never covered, although sometimes awash. From it Mont Orgueil Castle and Seymour Tower are exactly in line 350°, the latter distant 1.3 miles. A reef extends 300 yards southward from the Conchiere; therefore that rock should not be approached nearer than 600 yards.

A good clearing mark for the line of reef just described between the Frouquie and Conchiere Rocks is Corbiere Lighthouse, touching La Moye Point until the Grande Anquette Beacon is well open southward of the Conchiere Rock.

Violet Channel.—The sunken part of the Violet Bank commencing at the Conchiere Rock, extends eastward 1.5 miles, with dangerous reefs on its edge in the direction of the Echiquelez and Conchiere Rocks in line. Northward of these reefs for rather more than a mile the entire space is shoal water, with rocks innumerable; so that at low water it is difficult for a stranger to find his way through them, even in a boat. The southern edge of the bank is well marked at the last quarter ebb by a long string of rocks called the Route en Ville. Its eastern extreme is bounded by the Petit Four, a rock with 2 feet water; and the bank may be said to extend northward as far as the Cochon, Noire, and Grande Haisse Rocks.

The navigable part of the Violet Channel is between this sunken part of the Violet Bank and the Plateau de la Frouquie, the rocky bank to the southward, on the northern edge of which are the Goubiniere, Rousse Platte, and other dangerous rocks, and the Anquette rocks to the northeastward. The narrowest part is between the Petit

Four and the sunken rocks westward and northwestward of the Petite Anquette, where it is about ½ mile wide; but it is only about 200 yards wider between the Plateau de la Frouquie and the Route en Ville Rocks. The general depth is from 5 to 6 fathoms.

Anquette Channel leads out eastward between the Grande and Petite Anquette Rocks from the middle of the Violet Channel. The general depth of water is about the same as in the Violet Channel, but from the absence of good leading marks the passage is more difficult.

Near the point of separation of the Anquette and Violet Channels, with Princes Tower and Little Seymour Beacon in line, and with the Grande Anquette Beacon bearing east, is a rock with 23 feet water and another near it with 25 feet. Though nothing less than these depths has been found, caution is necessary with large ships passing through this part of the channel at low water. Vessels of 15 feet draft or upward should wait until the flood tide has fairly made, and with any swell on, should not pass through until the first quarter flood.

Dangers in the Violet Channel.—The Conchiere Rock, see preceding page, is the principal mark at the western entrance of the Violet Channel.

Taxe Rock, 1,250 yards eastward of the Conchiere, dries 10 feet at low water; from it the Conchiere and Echiquelez Rocks are exactly in line bearing 278°.

Route en Ville Rocks.—At 500 yards southeastward of Taxe Rock, with Echiquelez Rock open southward of the Conchiere, is the highest rock of the Route en Ville, which dries 11 feet; West Rock dries 6 feet at 100 yards 248° from it; and another rock, 200 yards eastward of the highest head, dries 10 feet. From these rocks eastward, and close to deep water, the Route en Ville chain extends for about ½ mile with an outward curve to the East Grune, its eastern rock, on which there is a depth of 5 feet; most of the rocks are nearly awash at low water. St. Martins spire in line with Gorey Tower leads over a 2-foot rock 100 yards within or westward of their eastern end.

To clear these rocks on their southern side, keep Iicho Tower open southward of the Conchiere Rock until Princes Tower is in line with Seymour Tower, after which keep Echiquelez Rock open southward of the Conchiere until Princes Tower is on with Martello No. 5 Tower in Grouville Bay.

Petit Four, with 2 feet water, is at the eastern extreme of the Violet Bank; from it Karame Rock just shut in with the outer part of the high tableland above Noirmont Point bears 279°; Coupe turret seen over the end of the bluff just within the breakwater house at Verclut Point, 334°; and Grande Anquette Beacon in line with the northern side of Petite Anquette Rock, 102°.

On the southern side of the Violet Channel the following are the principal rocks:

Plateau de la Frouquie.—**The Goubiniere** dries 20 feet at low water; it is at the western end of the Plateau de la Frouquie, very little eastward of Orgueil Castle, Seymour Tower, and Conchiere Rock in line, and distant from the latter nearly 1.3 miles. From the rock La Moye white semaphore house is over the outer part of Le Fret Point.

There are several rocks northward of the Goubiniere; the Canger Rock is the most northern; it dries 16 feet and is 200 yards distant from the Goubiniere.

Orgueil Castle open westward of Seymour Tower and of the Conchiere Rock clears the Goubiniere and all dangers on the western side of the Plateau de la Frouquie.

Frouquier Aubert Rock is at the southwestern edge of the Plateau de la Frouquie, nearly 1.3 miles southeastward of the Goubiniere; it uncovers 26 feet at low water and does not cover at neaps. From it St. Peter's spire is in line with the white patch on South Hill and St. Martin's spire is well open eastward of Seymour Tower 334°.

Rousse Platte Rock is at the eastern side of the Plateau de la Frouquie, and 80° rather more than a mile from the Goubiniere; it is a large flat rock about 100 yards in diameter and dries 14 feet. Between this rock and the Goubiniere are several rocks, of which one dries 15 feet, another dries only 4 feet but is the most dangerous, as it stands prominently out in the channel, which, between it and the Route en Ville Reefs, is only 1,200 yards wide.

Pierre des Enfants, 500 yards 141° from the Rousse Platte, is 7 feet higher than that rock, and is therefore a very useful mark when the Rousse Platte is covered.

Anquette Rocks.—**Petite Anquette** lies 2.5 miles 82° from the Conchiere Rock, and, with the Seal Rocks and Maraine Reef, forms the eastern boundary of the Violet Channel. The Petite Anquette uncovers 20 feet; from it Bergerie house on the heights above Noirmont Point, in line with the northern side of Motte Islet bears 282°; and Archirondel red tower with white band in St. Catherines Bay its apparent breadth open eastward of Rozel manor house 320°.

Seal Rocks form part of the extensive reef northward of the Petite Anquette, on which one of the most dangerous ridges is known as the Seals. The western Seal dries 4 feet 316° 650 yards from the Petite Anquette. A rock with only 12 feet water lies 330 yards westward of the western Seal; and the shoalest head of the Maraine Reef, with as little as 3 feet water, lies 355° nearly 1,200 yards from the Petite Anquette.

Grune Le Feuvre has only 6 feet water at its shoalest spot, which bears 16° 1.1 miles from the Petite Anquette.

Grande Anquette Rock—Beacon.—This rock lies 102° 1,450 yards from the Petite Anquette, and is 3.3 miles eastward of the Conchiere Rock; it covers at about 8 feet above half tide, but is marked by a conical iron beacon painted red, and surmounted by a staff and ball (or refuge cage) the center of the cage standing 30 feet above high water, ordinary springs. From the beacon, Rousse Platte Rock bears 240° 2.3 miles; Grande Arconie, which dries 9 feet 134° one mile; and Porpoise Rock, which dries 4 feet, 220° 1,700 yards.

Anquette Patches form a small rocky bank, with from 16 to 20 feet on its northeastern end, 21° one mile from the Grande Anquette; from the eastern shoalest spot of 16 feet, Seymour Tower in line with Motte Islet bears 274°; and Rozel mill twice its apparent breadth open westward of St. Catherine's white martello tower 207°.

Another bank of rock and gravel lies 88° 2 miles from the Grande Anquette, and 299° 3.7 miles from the Bœuf Beacon turret; from its shoalest part of 15 feet, Rozel mill is a little open eastward of St. Catherine's white martello tower; and Grande Anquette Beacon and the Conchiere Rock in line bears 268°.

Plateau de l'Arconie.—Some dangerous sunken rocks with as little as 3 feet lie from 300 to 700 yards, 96° from the Anquette Beacon; and the space southward of it for the distance of 1.5 miles is occupied by a vast shoal called by the French the Plateau de l'Arconie; some of the rocks on this shoal begin to uncover soon after the last quarter ebb at springs; others are only awash at low water, springs, and by far the greater part never uncover.

Grande Arconie Rock, which dries 9 feet, is at the eastern side of the plateau; the Porpoise Rock, drying 4 feet, marks its western boundary; the Grand Four Rock, drying 7 feet, and with several small rocks drying 2 feet in its vicinity, lies just within its southwestern extreme; and Grune la Hauche dries 6 feet one mile 102° from the Grand Four, and 1,470 yards 84° from the Grande Arconie.

The channel between Plateau de la Frouquie and Plateau de l'Arconie is 1.3 miles wide and has 5½ fathoms water, but its free navigation is impeded by a string of rocks extending across at unequal distances from each other between the Pierre des Enfants and the Grand Four; of these some are awash, others have 5 or 6 feet over them at low-water springs.

The great strength of the stream at this part of the channel and the absence of good marks render its navigation extremely perilous near low water. No vessel should attempt to pass through, therefore, until after the first-quarter flood.

Coupe Mound, open eastward of Verclut Point 333°, leads through the best part of the channel.

The Southern Anquettes commence near the southwestern extreme of the Plateau de l'Arconie and extend 5 miles southeastward in an almost continuous line. They consist of a number of narrow ridges of fine gravel, having generally a depth of from 3 to 4 fathoms, but with several scattered heads of from 1 to 2 fathoms. The marks for a detached 2-fathom bank near the southeastern end are La Moye White Semaphore House, just open northward of Frouquier Aubert; Grande Anquette Beacon, seen a little within Verclut Point 321°; Bœuf Beacon turret 51° 3 miles; and Basse le Marie 150° 3 miles.

There is a channel between the Southern Anquettes and the Plateau de l'Arconie, in which the depths are from 6 to 7 fathoms.

La Moye White Semaphore House, just open of Le Fret Point 292°, leads southwestward of the Southern Anquettes, of the Plateau de la Frouquie, and of all the rocks bordering the southern shore of Jersey, up to the leading mark for the eastern passage into St. Aubin Bay, and this line passes 1.3 miles northward of the Icho Bank.

Directions—Violet Channel.—If bound eastward from St. Helier through the Violet Channel, having cleared the dangers outside the Little Road, keep La Moye White Semaphore House open of Le Fret Point 292° until Orgueil Castle, seen over the lowland of La Roque Point, comes in line with Icho Tower 21°, at which position, about ½ mile from the outer edge of the reef, the Grande Anquette Beacon will be a little open southward of the Conchiere Rock 97°.

From hence, steer 95° parallel with the outer edge of the reef, the depth being from 5 to 7 fathoms. The Conchiere Rock should be passed at about 800 yards, and when eastward of it bring the Echiquelez Rock on with Noirmont Tower 185° for a leading mark until Princes Tower is in line with Seymour Tower; if the distance from the Conchiere and Route en Ville Rocks has been correctly preserved in passing them, the Rousse Platte should now bear about 203° 700 yards, and the Grande Anquette Beacon 68°. Now steer about 23° to pass through the deepest part of the channel, or to pass through the middle of it, steer 68° for the Grande Anquette Beacon until Coupe Mound is just open eastward of Verclut Point 333°, with which mark run toward the Petit Four; and when northward of a line drawn from the Conchiere to the Grande Anquette, edge to the eastward to bring Coupe turret open of Verclut Point, which mark leads 550 yards eastward of the Petit Four, 200 yards eastward of Giffard Rock, and through Gorey outer road. For mid-channel through the latter, however, the vessel should again edge away to the westward when Gorey Lighthouses are in line 296°, until Coupe Mound is just open of Verclut Point as before.

The narrowest part of the channel being between the Petit Four and Petite Anquette, it may be useful to know that Coupe turret and the breakwater house at Verclut, exactly in line, leads 200 yards outside the Petit Four; at this position Rozel Mill is touching the northern side of Mont Orgueil Castle, and St. Catherine's white martello tower is in line with Archirondel red tower. When abreast of the Petit Four, Karame Rock, just shut in with the highland above Noirmont Point, bears 279°, and the Grande Anquette Beacon open northward of Petite Anquette 104°.

Small vessels may haul out eastward of the Banc du Chateau when Echiquelez Rock is open northward of Karame Rock, but vessels of very deep draft should not do so until Icho and Seymour towers are in line, in order to avoid the stony banks 1,200 yards northwestward of Grune le Feuvre, on which the depth is but 25 feet at low water.

Grouville Bay, which derives its name from a hamlet near St. Clement's Church, is on the eastern side of Jersey, between La Roque Point and Mont Orgueil. Its outer southern boundary commences on the northeastern side of the Violet Bank and is very rocky; numerous masses of rock lie scattered along the low-water line to the northward, which line is nearly a mile from the shore in the southern part of the bay; there are also many rocks within as well as outside this line. Grouville Bay at low water is very picturesque, with its vast expanse of fine white sand rising with a gentle slope toward the shore, bounded on the south by Seymour tower and the rugged rocks of the Violet Bank and on the north by Mont Orgueil and its venerable castle.

Horn Rock—Beacon.—The Horn Rock, 140° 1.3 miles from Mont Orgueil Castle and 1 mile southward of the Equerriere Beacon, in the center of the bay, is the outer rock of the Frouquies de la Greve, dries 16 feet and is marked by a beacon consisting of a staff and horizontal cross.

Little Seymour Rock—Beacon.—Among other rocks on the southern side of the bay is Little Seymour Rock, awash at high water, and marked by a pole-and-basket beacon, from which a long string of rocks extends eastward, forming the low-water boundary of the bay. The most important of these rocks are the Cochon, at the outer edge, which dries 7 feet; the Grande Haisse, which dries 22 feet; and the Noire, which dries 14 feet at 1,900 yards 153° from the Horn Rock and 1,800 yards outside Little Seymour Beacon.

The Giffard, a most dangerous mid-channel rock in approaching Grouville Bay from the southward, lies about 800 yards northeastward of the Noire and has only 1 foot over it at low water. From it Little Seymour Beacon, open northward of Gros Etac Rock, bears 233° about 1.2 miles; Rozel Mill, a little open westward of Crete Guardhouse, 319°; Horn Rock Beacon, 307° 1,470 yards, and a depth of 12 feet water on the South Ridge sand of the Banc du Chateau 43° 800 yards.

Road Rock, 800 yards 330° from Horn Rock Beacon, and 250 yards outside the Grune du Port, has 9 feet water; from it St. Catherine's white martello tower is just shut in with Crete Point, and No. 5 martello tower in line with the extreme end of the high tableland southward of Grouville bears 246°. A 14-foot patch lies 136° 200 yards from the Road Rock.

A small rock, with 26 feet water and 5 to 5½ fathoms around it, lies 500 yards from Road Rock in the direction of Verclut Point; halfway between this and the Dasher Rock and about 250 yards distant from each, is the Inner Road Rock with 16 feet water. From this rock St. Catherine's tower is just shut in with Crete Point and Gorey Pier Lighthouse is open northward of the Ecureuil Beacon, the latter being 450 yards distant.

Gorey town and harbor, at the northern end of Grouville Bay, are immediately under Mont Orgueil Castle. The little town contains about 1,000 inhabitants; it is considered to be particularly salubrious and has railway communication with St. Helier and by steamer with the coast of Normandy. It has a fair trade in vegetables, fruit, coal, cattle, timber, etc. Supplies of all kinds can be obtained, including coal in limited quantities, but vessels requiring coal, unless it can be shipped during tide time, 4 or 5 hours, have to lie aground in their berths. Hospital accommodation at St. Helier is available in case of sickness or accident.

Depths.—The harbor is formed by a stone pier built out from the southwestern part of Orgueil head. The outer berth alongside the pier has a depth of only 9 feet at half tide, about 23 feet at high water springs, and 14 or 15 feet at neaps; at low water springs the sand dries 200 yards outside the pierhead.

Two small warping buoys are moored at the entrance to assist vessels arriving or leaving, the outer buoy about 200 yards southwestward of the pierhead, the other about 80 yards westward of the pier. The bottom of Gorey Harbor, consisting of mud and sand, affords good grounding berths.

Vessels of 300 tons may occasionally be seen here, though the bottom dries at low water from 10 to 15 feet; as it is the headquarters of the oyster fishery, a number of sloops of from 30 to 50 tons belong to the place. Sharp vessels not provided with legs should always get a pier berth and list inward, assisted by masthead tackles to the shore, to prevent falling over at low water.

Mooring buoy.—A Government mooring buoy is charted in a depth of 11 feet, with Gorey Slip just open of the pierhead and Horn Rock and Ecureuil Beacons in line distant only 200 yards from the latter; this buoy was reported in September, 1905, to have been sunk for about a year. The ground chain of these moorings lies north and south; there is a length of 38 fathoms on each arm, and the anchors are of 24 and 30 hundredweight. About 200 yards within the buoy there is 7 feet water and 3¼ fathoms at the same distance outside, but on the northeastern side at this distance there is a rock with only 1 foot water upon it at the lowest tides lying 100 yards westward of the Equerriere Rock.

Lights.—From Gorey Pierhead a fixed light is exhibited at an elevation of 28 feet above high water, showing red over La Goubiniere, La Grande Arconie, and other dangers, and green from all other directions seaward. The light is visible 10 miles.

A signal station established here will exchange signals both night and day.

On the slope of the hill, from a red lantern in the face of the wall below Gorey Church tower, at 535 yards 297° from the pierhead lighthouse, and at an elevation of 80 feet above high water, is exhibited a fixed red light, visible from a distance of 8 miles.

The two lights in line, bearing 297°, lead northward of the Frouquies de Greve and of the Road, Fisherman, and Azicot Rocks and southward of the Ecureuil Rock, in passing which latter the red light should on no account be opened northward of the green light.

Dangers—Beacons.—The principal dangers in the immediate neighborhood of the port of Gorey are the following:

The Equerriere is the largest and most conspicuous rock off Gorey Harbor; it bears 87° from the pier head, dries 35 feet, and is marked by a pole and fish-tail beacon. A rock, drying 14 feet, lies about 135 yards 119° from the Equerriere, and a small patch, with only 1 foot water over it at lowest tides, lies at about the same distance 260° from it.

Dasher Rock, with 2 feet water over it and from 18 to 20 feet close-to, lies 175° about 250 yards from the Equerriere Rock; a small, pinnacle rock at about the same depth lies 50 yards 6° of the Dasher Rock, with the Ecureuil Rock Beacon bearing 240°.

The Ecureuil, 300 yards 206° of the Equerriere, dries 14 feet, and is marked by a pole and basket beacon.

Fisherman Rock, with 8 feet water, lies 170° 250 yards from the Dasher Rock.

Other rocks which abound here, though smaller, are very dangerous, such as the Azicot Rock outside Gorey Pierhead, which dries 5 feet and is marked by a spar buoy; the Guillimots, a group of rocks 175° 500 yards from the Azicot, of which group the outer rock dries 6 feet and is marked by a spar buoy; the Burons, a rocky group 400 yards about 119° from the Guillimots, of which the northern rock dries 12 feet and is also marked by a spar buoy; and the Grune du Port, with 5 feet water 600 yards outside the Burons, on a line connecting Gorey Pierhead and Horn Rock Beacon, but 750 yards inside the latter.

The Tres Grunes lie 400 yards outside and eastward of the Equerriere Rock and are awash at low water. Little Seymour Beacon, in line with Seymour Tower 184°, leads 150 yards eastward, but passes over a 25-foot rock just outside them, which rock is the extreme end edge of the ledge, the water being deep close up to it.

To clear this outer rock when passing the Tres Grunes in a large vessel Little Seymour Beacon should be kept perceptibly open westward of Seymour Tower.

Northward about 250 yards from the Tres Grunes is the Pacquet Rock with 2 feet water; within and northwestward of which, at about the same distance, are the Arches Rocks, a small group which dry 14 and 15 feet, the southeastern rock being marked by a spar buoy. Northward of these again, and within 600 to 900 yards of Mont Orgueil are the Grand Houmet, Le Mont, Seven Grunes to be presently described, and many other rocks, the ground here being very foul.

Directions.—To enter the Inner Road or Gorey Harbor, three channels are available according to state of tide. For the southern channel, the leading mark by day is the red lantern of the high light on with the pierhead 297°, and by night, the two lights in line. For the middle channel, the northern end of the white house at the top of Hardway a little open northward of the pierhead 276° leads between the Equerriere and Ecureuil Rocks up toward (but about 50 yards northward of) the government mooring buoy in the Inner Road. For the northern channel, the leading mark is the chimneys of Fort William in line with the pierhead 251°; as this leads close past the Arches Rocks, it will be well to open the chimneys a little southward of the pierhead before Equerriere and Ecureuil Beacons are in line.

If entering the harbor, having approached it by either of these channels, run up to the entrance, passing on either side of the Azicot spar buoy, but leaving both the warping buoys near the pierhead on the port hand in rounding it, and be careful not to approach the pier too closely, as the tide sets round it to the eastward with great strength after half flood, at springs. When the Horn Rock is awash, there is a depth of 10 feet water just off the end of Gorey Pier and 5 feet at the outer berth alongside it.

Banc du Chateau.—This extensive bank of sand, gravel, and shells, lies off Grouville Bay nearly parallel with the low-water line of the shore and distant from it rather more than a mile, except at its northern end which approaches Mont Orgueil within 1,500 yards; it forms a great natural protection to the anchorage in Gorey Roads. Within the 5-fathoms line, the bank is rather more than 2 miles in length and 800 yards wide; the main body has a general depth of 2½ to 3 fathoms, gravel bottom; from this base rise numerous narrow sandy ridges extending across the bank in a 96° and 276° direction. Near the middle, for about a mile, these ridges are so close together as to form almost one continuous bank, and have accordingly been named the Middle Bank. At very low tides, parts of these ridges occasionally dry.

The North Ridge is nearly 800 yards within the northern end of the Banc du Chateau, and has from 10 to 12 feet water; just southward of it is a smaller ridge with as little as 4 feet.

The South Ridge, with from 12 to 16 feet water, forms the southwestern and southern edge of the bank close to deep water.

The Banc du Chateau is much affected by the weather and by the action of the tidal streams; the upper part, within a limited space, is continually shifting, and during westerly winds the ridges of the sandbanks are so sharp that, when awash, a boat may easily knock them down in passing over. At such times the banks are about 4 feet higher than with easterly winds.

Clearing marks.—Grouville mill (white), which stands on the high land southwestward of Grouville Church, but has no sweeps, on with the southern side of Mont Orgueil Bluff 231°, clears the 5-fathoms line at the northern end of the bank. Icho Tower and Little Seymour Beacon in line 240° lead close past its southern end. Coupe Turret on with the breakwater house under Verclut Bluff 232° clears the northwestern corner and leads down its western side nearly in midchannel, and Coupe Turret in line with St. Catherine's Breakwater Lighthouse 316° leads eastward of the bank as well as of a rocky 5-fathoms patch outside, but westward of the West Tongue Sand.

Tongue Sands are two small shoal banks nearly 1 and 2 miles, respectively, eastward of the south ridge of the Banc du Chateau, but separated from it and from each other by good clear channels. They are of the same character as the Banc du Chateau, having sharp ridges of fine sand. The least water on the eastern bank is 6 fathoms and on the western bank 23 feet.

From the 23-foot ridge Coupe Turret open eastward of St. Catherine's Lighthouse bears 313°, and Icho Tower is a little open northward of Little Seymour Beacon.

Anchorage.—Between the western side of the Banc du Chateau and the 5-fathoms line fronting Grouville Bay is the outer road, a safe anchorage and large enough to accommodate several vessels of deep draft, it being a mile long north and south by 900 yards in width. The eastern limit is marked by Coupe Turret being on with the breakwater house at Verclut Bluff, and its western limit by St. Catherine and Archirondel towers in line. At its northern extreme Gorey Pierhead is open southward of the Equerriere Beacon, and at its southern end No. 4 martello tower and the Horn Rock Beacon are in line west. The space included within these limits has a depth of from 6 to 8 fathoms, with an even botton of gravel and shells, and the best line on which to anchor is with Grouville spire on with Fort Henry.

The Inner Road is within the 5-fathoms line of Grouville Bay, between the road and Inner Road Rocks, and between the Equerriere Beacon and the Burons Rocks. Inshore of this space is the Government mooring buoy. The best line on which to anchor in the Inner Road is, with Princes Tower open northward of Fort William the apparent breadth of the latter.

The anchorage in Gorey roads is the only place in the Channel Islands, or on the French coast from St. Malo to Cherbourg, where a squadron of heavy ships might find good shelter in a westerly or northwesterly gale; and, with proper charts and sailing directions, the approach is sufficiently easy for any seaman, in clear weather, to take his ship in without the aid of a pilot.

Directions—Grouville Bay.—The approach to Grouville Bay from the direction of the Violet Channel has been already given. When running for this bay from the northward, and having cleared the Pierres de Lecq, the Drouilles, and other dangers near the northern end of Jersey by the directions hereafter given; avoid the foul ground off Nez du Guet and Coupe Point by giving each a berth of at least 600 yards in rounding them. Belle Hougue Bluff open northward of Tour de Rozel Point 289° leads outside the dangers off Coupe Point and 1,200 yards northward of the Pillon Rock off Verclut Breakwater; La Roque No. 1 martello tower in line with the Equerriere Beacon 201° or Seymour Tower and Little Seymour Beacon in line, leads eastward of them but between and close to patches of from 15 to 18 feet at low water, and over the Fara Ledge in a depth of 20 feet.

The North Channel into Gorey Road is between the southeast end of St. Catherine or Fara Bank and the northern end of the Banc du Chateau, but there is only 50 yards wide between the 5-fathoms curves at low water, with a depth of 6 fathoms in mid-channel to the southward. Fara Ledge, with a least depth of 17 feet at low water, and several detached shoal heads with from 15 to 21 feet, lie in the approach from the northward separated only by very narrow passages, and a vessel of deep draft should therefore only use this channel when the water is above half-tide level.

Entering this channel from the northward, keep Belle Hougue Bluff open of Tour de Rozel Point 288° until Little Seymour Beacon is well open westward of Seymour Tower 184°, then steer to the southward to bring Grouville mill in line with the south side of Mont Orgueil Bluff 230°, which will lead between Fara Ledge and Banc du Chateau in not less than 21 feet at low water, until Le Coupe Mound is open of Verclut Bluff 333°, when a 153° course with this mark astern will lead to the roadstead. The above is a sharp turn for a long vessel, and the helm should be put to starboard in good time; a good mark for doing this would be when Le Coupe Point is in line with Le Fara Beacon.

To anchor as near the shore as possible, Coupe turret may be shut in a little over Verclut Point, but Little Seymour Beacon should be kept perceptibly open westward of Seymour Tower until Fort William is open southward of the Equerriere Beacon, in order to clear the Tres Grunes, or until the best anchoring lines, already given, are approached, when anchor as convenient.

The South Channel is between the shore reefs on the western side and the southern end of the Banc du Chateau and reefs northward of the Anquettes on the eastern side, and, as the narrows are reached, between the Giffard Rock and the south ridge of the Banc du Chateau, where it is only 700 yards in width. The water is deep throughout, there being not less than 8 fathoms in mid-channel at the lowest tides.

Approaching this channel from the northward, to clear a small rocky bank of 5¼ fathoms outside the Banc du Chateau, keep Coupe turret outside St. Catherines Lighthouse until Princes Tower comes in line with Gorey Pierhead, after which the turret may be brought inside the lighthouse as far as the outer arches of the breakwater, and when Icho Tower opens southward of Little Seymour Beacon, haul in around the southern end of the bank.

Rozel mill over Crete Bluff clears the inside part of the south ridge, but the leading mark, which clears the Giffard Rock by 250 yards, is Gorey spire, in line with the white patch on Gorey Pierhead 303° until Coupe Mound opens of Verclut Bluff, with which mark run up to the anchorage in the Outer Road, anchoring as before directed.

A large vessel working into the Outer Road through the South Channel should not open Icho Tower southward of Seymour Tower until Coupe turret is westward of the middle of St. Catherines Breakwater, in order to clear the Stony Banks, of 25 feet least water, northward of the Petite Anquette.

From Grouville Bay to the southeastward.—Bring Gorey spire open a little westward of the white patch at Gorey Pierhead 303° and run out until Icho Tower is midway between Seymour Tower and Little Seymour Beacon about 246°; haul out to the eastward on this line until Coupe turret opens eastward of St. Catherines Lighthouse, which mark leads clear of all danger off the Anquettes.

To the southward through the Bœuf Channel.—After clearing the Anquettes as described bring Coupe turret in line with St. Catherines Lighthouse 316°, and, with this mark on, steer to the southward. As the line of Icho and Noirmont Towers in one is approached Coupe turret may be brought a little westward of the lighthouse; and, when southward of this line and clear of the Grande Arconie, Coupe turret should be brought westward of the lighthouse at least one-third the distance to Verclut Point, to clear the western side of the Basse Occidentale des Bœufs, from whence, if bound for Granville, the same mark on astern and a 139° course lead past the Basse le Marie red buoy and up to the leading marks for the Cotentin Channel; or, if bound westward, a 189° course leads to the channels between the Southern Anquettes, which banks may be always known and avoided by the tide ripples over them, and when La Moye white semaphore house opens of Le Fret Point 292° the gravel banks are passed and a vessel may haul to the westward.

In passing through this channel it should be remembered that Coupe Turret, touching the outer part of St. Catherines Lighthouse, leads over the Anquette northeastern patch, and also over the Basse Occidentale des Bœufs.

A small vessel bound southward from Gorey on the flood may pass inside Grune Le Feuvre and the Anquette northeastern patch by bringing St. Martin's spire open northward of the white patch on the northern side of Mount Orgueil Castle, at least the width of the patch, 307°.

At or before half flood a small vessel may also pass between the Plateau de la Frouquie and the Plateau de l'Arconie by keeping Coupe Turret in line with the breakwater house at Verclut Point 333° until La Moye white semaphore house is on with Le Fret Point 292°, when she may haul to the westward.

Approaching the Bœuf Channel from the southward, if the marks on Jersey are indistinct, Mont Huchon, on the French coast, in line with the sandy point of Blainville River entrance 88°, or Coutances Cathedral on with the southern end of Blainville village and well open southward of Blainville Church 96°, lead up until they can be made out.

It is, however, generally difficult and often impossible to distinguish the marks for this channel owing to their distance; a vessel of deep draft should therefore only attempt it in charge of an experienced pilot and during the upper half of the tide; nor should square-rigged vessels ever attempt to work through except under such conditions.

From Grouville Bay through the Violet Channel.—Run out as before with Gorey spire open westward of the white patch on the pierhead 303° until the northern side of Gros Etac Rock is in line with Little Seymour Beacon 231°. The vessel is then abreast of the Giffard Rock, and Coupe Turret a little open of Verclut Point becomes the leading mark with which to enter the Violet Channel; and, when approaching the narrows, be particular that Coupe Turret is only just open eastward of the breakwater house at Verclut Point. As a check it is useful to know that if any part of St. Catherine's white martello tower shows eastward of Archirondel red tower you are quite far enough to the eastward. Another good mark for the middle of the channel when abreast of the Petit Four is Rozel mill, touching the northeastern side of Mont Orgueil Castle 321°.

When abreast of the Petit Four, Karame Rock is just shut in with the high land above Noirmont Point, and Grande Anquette Beacon is open northward of the Petite Anquette. From this position haul to the southward to bring Coupe mound open of Verclut Point and use it for the leading mark; or, if the Rousse Platte Rock is uncovered, steer direct for it on a 203° bearing until Grande Anquette Beacon bears 68°. In either case steer westward with the Anquette Beacon on that bearing until Icho Tower is in line with the Conchiere Rock, when the vessel is clear of the Route en Ville Reefs, and may steer to pass 600 or 800 yards southward of the Conchiere Rock.

Anne Port Bay, between Grouville and St. Catherine Bays, is small, and outlying rocks render the approach to it dangerous; there is, however, good anchorage off it, occasionally used by fishing boats and other small craft in fine weather. The principal dangers are, on the southern side, the Seven Grunes, and, on the northern side, the Cloches Rocks. Between these reefs is the anchorage; it is 500 yards in extent north and south, has an even depth of 4½ or 5 fathoms, and is sheltered from the tide.

The Seven Grunes form a long, straggling reef extending 700 yards eastward from the Grosse Moie; the highest rock, near the middle of the reef, uncovers 7 feet, and the outer Grune, called Le Mont, has 5 feet water over it.

The Cloches Rocks extend in an 85° direction 1,100 yards from Crete Point to a rock with only 1 foot water. They are the southern rocks of the Fara or St. Catherines Bank, and several heads inshore of the 1-foot rock dry from 1 to 5 feet.

St. Catherines Bay, on the eastern shore of Jersey northward of Mont Orgueil Castle, though much encumbered by rocks, affords excellent anchorage for small craft in 2 or 3 fathoms water, with a bottom of muddy sand covered with very long grass and seaweed. It is difficult, however, for a sailing vessel to enter or leave except with a leading wind. The bay is completely sheltered from northerly, westerly, and southwesterly winds, but southeasterly and easterly winds blow right in and near high water cause a short, turbulent, chopping sea. As the tide falls, however, the sea subsides.

A harbor of refuge was begun in this bay in the year 1847. The northern pier or breakwater was completed in 1855, and extends 826 yards 119° from Verclut Point, the northern extreme of the bay, and over the rocky bed formerly called the Pierre Mouillee. It has a depth of 5 fathoms at its outer end at low water, and on the pierhead stands the lighthouse. The pier has a lofty parapet, and alongside it a steamer of large size might coal and water with any wind from north by east round by west to southwest by south.

The southern breakwater was designed to extend in an easterly direction from the point near Archirondel Tower across the Fara Reef. Of this, however, only about 200 yards has been built, and the work discontinued.

Should the southern pier ever be completed and a harbor formed, it might prove useful in bringing Jersey into closer commercial relations with France; but from the great strength of the tides across the entrance of the bay, and from the dangerous rocks near, it is now difficult of access to sailing vessels in bad weather and only fit for ordinary use by steamers.

Light.—From a white octagonal iron lighthouse, 30 feet high, on the outer extreme of the parapet wall of Verclut Breakwater, is exhibited a fixed white light at an elevation of 60 feet above the level of high water, visible 10 to 12 miles.

Dangers off and in St. Catherines Bay.—The approach to St. Catherines Bay from the southeast is completely barred by St. Catherine or Fara Bank, a large bed of rocks about ½ mile square, of which the outer part extends 1,600 yards eastward of Archirondel Red-and-white Tower. The rocks begin to uncover about the last quarter ebb. Many show at low water, but by far the greater number never dry.

Beacon. — On the southern edge of the bank are the Cloches, already described; on the eastern side the Fara Rock, about ½ mile wide, which dries 9 feet and with a pole and cross beacon in its center is the most conspicuous rock; also, on the eastern side, the Grune du Nord, which dries 1 foot, and within, on the northwest and north, the Basses de Fara and the Etot Rock, which dries 10 feet.

Fara Ledge, about 600 yards southeastward of the Fara Beacon, is a rocky bank about 200 yards in length 96° and 276°, rather more than half that width and about the same distance detached from a depth of 2 feet on the edge of St. Catherines Bank. The least known depth is 17 feet at its eastern end, but 270 yards north from this spot there is a small 15-foot patch, from which Fara Beacon bears 271° distant nearly 600 yards. No. 2 martello tower, in Grouville Bay, open clear to the southward of the Equerriere Beacon 206°, just clears the southeastern side, and Little Seymour Beacon, in line with Seymour Tower, leads over its western end in 20 feet. This latter mark also leads over the outer part of St. Catherines Bank, northward of the Fara Ledge, in 24 feet, but between patches of 15 feet (see above) and 17 feet, and almost directly over a patch of 18 feet lying 56° 650 yards from the Fara Beacon. Coupe Turret, in line with St. Catherines Lighthouse 316°, or a little open eastward of it, leads outside the Fara Ledge and Reef up to the lighthouse, passing close southwestward of the 18-foot patch and leaving the Eureka and Pillon Rocks on the starboard hand.

Eureka Rock, with 12 feet water, lies 500 yards from the lighthouse, with the northern side of the breakwater slightly open and No. 4 Martello Tower just shut in with Mont Orgueil Point.

The Pillon Rock has only 4 feet water; it bears 338° 250 yards from the Eureka Rock and is 400 yards from the breakwater end. From the rock St. Martin's spire is in line with the lighthouse and No. 3 Martello Tower is just shut in with Mont Orgueil Point.

Within St. Catherines Bay, in line between the lighthouse and Archirondel Tower and 450 yards from the lighthouse, is a rock with only 7 feet water. Le Graveur, another rock with the same depth, lies northward of a line drawn from the lighthouse to St. Catherines Martello Tower, with Coupe Turret just showing over Verclut Point.

Caution.—During spring tides the stream sets with great velocity over St. Catherines Bank into the bay and also around the end of the breakwater, for which due allowance must be made in entering or leaving the bay.

Anchorage.—There is barely room for one large ship to anchor in St. Catherines Bay. The best berth is in a depth of 4½ fathoms about 200 yards distant from the breakwater and 300 yards westward from the lighthouse.

Small vessels may anchor farther up the bay in 2 fathoms, with St. Martin's spire in line with the southern extreme of the bluff northward of St. Catherine's martello tower 268°, and Seymour Tower in line with Grosse Moie 172°. About 200 yards inshore of this the depth is only 1 fathom, and the same distance farther offshore 3¼ fathoms. The bottom is a mixture of fine sand and mud throughout.

Directions—From Grouville to St. Catherines Bay.—Run out from Gorey Inner Road with Prince's Tower open northward of Fort William until Little Seymour Beacon is just westward of Seymour Tower, which mark clears the Tres Grunes and foul ground outside them; having passed these, bring Little Seymour Beacon and Seymour Tower exactly in line to pass over Fara Ledge in 20 feet, or No. 2 Tower well open southeastward of Equerriere Beacon to pass outside Fara Ledge.

With Coupe turret in line with St. Catherines Lighthouse a vessel is clear of all the rocks of St. Catherines Bank (except the 18-foot patch 650 yards 56° from Fara Beacon, which lies a little eastward of this line) and may steer for the lighthouse, hauling into the bay when 200 yards distant from it, with St. Martin's spire nearly shut in over the bluff northward of St. Catherine's martello tower for a leading mark, and anchoring as convenient by the marks just given.

There is another passage into this bay from the southward between the Cloches and Crete Point which, though much encumbered by rocks nearly awash at low water, may be convenient occasionally to small craft with pilots. A very useful mark for this small channel during the lower part of the tide is St. Catherine's martello tower in line with the eastern side of Little Fara Rock to clear Le Mont, the outer rock of the Seven Grunes; and having passed that danger open the tower a little inside the Little Fara before passing Crete Point to clear the rocks along the inner part of St. Catherines Bank. A vessel may pass close inside the Little Fara in 9 feet at low water, ordinary springs.

Coupe Point is a bluff about 180 feet high, and so named from its being connected with the neighboring land by a narrow neck of little more than half that height. On the summit of the bluff is a ruined guardhouse surmounted by a stone sentry box or turret, a conspicuous and very useful mark, known as Coupe Turret, to which frequent reference is made. An extensive range of farm buildings stands near the edge of the plateaux southward of and overlooking the Coupe; two high rocks lie 100 yards outside the bluff, from which a dangerous reef extends eastward.

Fliquet Bay is between Verclut and Coupe Points, and affords good shelter from southwesterly winds, but is quite exposed to those from southward round by east and north to west by north. As Gorey Road affords indifferent shelter, with southerly winds, vessels bound to Gorey Harbor during strong winds from that quarter and not able to save their tide in, may anchor under shelter of the breakwater until two hours flood, when they will still have sufficient southerly tide to enable them to reach the road by the time there is water enough to enter the harbor. No vessel, however, should anchor in this bay with the intention of remaining longer than a tide, for a shift of wind to southeastward or northeastward would place her in a dangerous position. The bottom is hard sand, free from any foul ground except the Brayes, a small group of rocks which dry and extend 350 yards from Coupe Point, and the Coupe Rock, with 10 feet water, 99° 900 yards from Coupe Turret and 343° 1,150 yards from St. Catherines Lighthouse. The white patch in the center of the northern side of the breakwater in line with Mont Orgueil Castle leads outside the Coupe Rock.

Telegraph cable.—The telegraph cable between Jersey and France is laid in a 102° direction from Fliquet Bay to Pirou on the French coast. The shore end in Jersey is at the white martello tower in Fliquet Bay, on which is painted in black letters the word "telegraph," surmounted by a green disk.

To prevent damage to the cable or loss of anchors, grapnels, or dredges by the fishermen the following directions are given: The course of the cable is distinctly indicated by the two towers, which are a sufficient guide during the day for clearing it. Fishing boats without a compass may avoid it on the south by not opening the Tour de Rozel northward of Coupe Point and on the north by not shutting in the guardhouse in Bouley Bay with the Tour de Rozel.

Anchorage.—From the northward Seymour House, on the hill northward of Gorey, in line with or a little eastward of the breakwater house under Verclut Point, 186°, leads between the Brayes and Coupe Rock; and, from the eastward, Rozel mill in line with Fliquet telegraph tower, 272°, leads between the Pillon and Coupe Rocks. The best anchorage, with southerly or southwesterly winds, is in a depth of about 6 fathoms midway between the breakwater and the Coupe Rock, with Nez du Guet and Coupe Point in line 299°; and, the martello tower on the hill northward of Mont Orgueil Castle in line with the center of the breakwater. Care is required in taking up this anchorage, as it is only 200 yards northward of the telegraph cable. With westerly winds, anchor nearer Coupe Point in about the center of the bay.

Rozel Bay.—About 299° nearly 1 mile from Coupe Point is Nez du Guet, and between them is Rozel Bay, which, being exposed to all winds from south-southeast round by east to northwest, is only used as an anchorage to await sufficient water to enter the harbor. In addition to the foul ground off the points of the bay, there is a rocky group called the Hiaux, which uncovers 2 feet, situated 200 yards from the western shore and 250 yards from the pier head, one head lying with the Royal Hotel in line with the white patch on the pier head; there is also a sunken rock with 5 feet water on the southeastern side of the entrance to the harbor 200 yards from the shore.

Rozel Harbor.—This small but useful harbor in the western part of Rozel Bay is dry throughout at low water; it has a stone pier capable of affording shelter to 20 small cutters, such as are employed in the oyster fishery; the harbor affords berthing places to six vessels of from 40 to 50 tons. Northwesterly winds cause a great range, so that vessels frequently carry away the large hawsers used in mooring alongside the pier. Gorey Harbor is preferable to Rozel in every respect.

The mouth of the harbor is much obstructed by large, flat, half-tide rock, on the southern side of the entrance, between which and the pierhead there is only room for two small vessels to enter abreast. With a foul wind, vessels are obliged to kedge in or out.

Directions.—Entering Rozel Harbor from the northward, keep St. Catherines Lighthouse in sight outside Coupe Point until the Royal Hotel at Rozel is southward of the white patch on the pierhead 240°, which mark leads southward of the Hiaux and to the entrance of the harbor. Give the pierhead a close shave to avoid the half-tide rock just described. If waiting tide to enter the harbor, the best anchorage is in the northwestern part of the bay, with the Royal Hotel in line with the white patch on the pierhead and the lower and upper part of the wall of Nez du Guet Fort in line, or the two chimneys of the guardhouse in the fort in line. To keep outside the Hiaux do not shut in the Tour de Rozel with the Nez du Guet.

Tides.—It is high water, full and change, in Rozel Bay at 6h. 15m.; springs rise 30 feet, neaps 21½ feet.

Tour de Rozel forms a most useful mark; it is a conical mass of rock 155 feet high, detached from the point within it, and about 800 yards northwestward of Rozel Bay. A half-tide rock, the Demie de la Tour, lies 150 yards outside it. With this exception, the approach to it is quite safe.

Rozel Mill, also a most useful mark repeatedly referred to in this work, stands on high land ½ mile southwestward from the shore of the bay, and is 335 feet above the level of the sea. It has no sweeps, but has a white dome roof, and the body of the mill is of a reddish color. About 35 yards northeastward of it is the mill house, a white building with a black roof, which obscures the mill from view when bearing between 175° and 209°.

Bouley Bay, on the northern side of Jersey, between Tour de Rozel and Belle Hougue Point, affords good shelter with the wind from west around by south to southeast by south. The only dangers in and near this bay are the Oyster Rocks, the Troupeurs, the Sambues, and the Grune de Vicard, a small rock near the western shore.

Oyster Rocks, extending 250 yards 6° from Meulet Point, are 550 yards inshore of the Troupeurs and dry 13 feet at low water.

Troupeurs Rocks, near the middle of the bay, are the two highest heads of a small rocky bank about 70 yards apart, which bear from each other about 30° and 210°; the outer head has 10 feet water, the inner head 7 feet. From the outer head, the inner high rock of the Pierres de Lecq is a little open of Belle Hougue Point; and the western side of Meulet Point on with the western side of the high cliff immediately above it bears 175°. The whole of the Pierres de Lecq Group well open of Belle Hougue Point leads northward of the Troupeurs, and Great Rock, near the middle of the group, shut in behind Belle Hougue Point leads southward.

The Sambues are nearly 800 yards eastward of Belle Hougue Point, and extend 450 yards from the shore; they uncover soon after half ebb. Coupe Turret in line with Tour de Rozel Point 125° leads outside the Sambues, Troupeurs, and all shoal ground off Belle Hougue Point.

Grune de Vicard is nearly 200 yards from the shore between the two guardhouses and has 2 feet water over it.

Anchorage.—To anchor outside the Troupeurs in a depth of from 8 to 10 fathoms, gravel bottom, keep the whole of the Pierres de Lecq at least a point open of Belle Hougue Point or Coupe Turret open of Tour de Rozel Point, and the white tower of Castle House on the high land overlooking the bay, on with Bouley Pier 170°. Or closer in, with Trinity Church in line with the pierhead 229°, and Belle Hougue Point, seen over the land, a little northward of Vicard Point 299° in 5 fathoms, fine sand. This is a safe anchorage with southerly winds, but open to those from the northward.

Directions.—To enter Bouley Bay from the eastward, steer in with the slate-roofed house on the western side of the bay above the pier, in line with the pierhead west; this leads between the Demie de la Tour, on which the tide sets strongly, and the Troupeurs Rocks up to the inner anchorage 500 yards off the pier in 4¼ fathoms. Vessels anchored in this bay during southwesterly gales should be prepared to weigh directly the wind begins to veer to 299° and run either to St. Catherines Bay or Gorey Road.

Belle Hougue Point, about a mile westward of the anchorage in Bouley Bay, is the highest and, except Grosnez, the most remarkable headland on the northern coast of Jersey. From it a reef of sunken rocks extends 400 yards offshore; this reef is cleared on its northeastern side by keeping Coupe Turret open of Tour de Rozel and on its northern side by keeping Plemont Point in sight outside Ronez Point.

Off-lying shoals.—Off the northeastern coast of Jersey are the Ecrehos and Drouilles Shoals, which, with their off-lying banks and rocks, together cover a distance of 7.7 miles 293° and 113°, and have an extreme width of 2.3 miles. Between them and Jersey is Le Ruau, a clear navigable channel 2.3 miles wide at its narrowest part, and greatly protected during northeasterly gales by these reefs.

Ecrehos Rocks, with their southern side about one-third of the distance between the northeastern coast of Jersey and Cape de Carteret, lie at the eastern part of the reefs referred to, and are separated from the Drouilles to the westward and the Ecreviere Banks to the eastward by very narrow and shallow channels.

The main group of the Ecrehos Rocks occupy a space near the center of the reef 1.3 miles in extent north and south and 1,600 yards wide, the whole of which space dries before low water. Maitre Ile, whose summit rises about 30 feet above the level of high water, is the largest of the group, and is at the southeastern extreme of this part of the reef; along the steep eastern side, to the northward, are the rocky islets Marmotier, Blanc Ile, Tas de Pois, and Vielle, the two latter being conical rocks 20 and 24 feet high, respectively, above the same level.

On the southwestern side are the high rocks Cotes and Colombier, and northward of them the Grosse Tete and Petite Tete, the latter being the only one that ever covers with the tide.

Maitre Ile, Marmotier, and Blanc Ile are the largest of the Ecrehos group, and on each there are huts for the use of fishermen. Maitre Ile alone is large enough to preserve its soil from being swept away by wind and sea, and is therefore the only islet having any vegetation, which consists of coarse grass and a few stunted shrubs. Large rats abound, but neither fresh water nor fuel are to be found on any of these islets, which are, however, visited by Jerseymen during the summer season for the purpose of fishing and cutting vraic.

Maitre Ile being one of the principal stations for the survey of Jersey, the exact position of the instrument is marked by a pole surmounted by a barrel, painted black with a white band, with a large pile of stones at its base; it stands on the highest part of the island near the middle and is a conspicuous and useful beacon.

Along the eastern side of the main reef of the Ecrehos but separated from it by a narrow channel is a tangled mass of rocky reefs, narrow at its northern end near the Vielle but widening and increasing its distance from the main reef as it extends southward, with an outward curve to abreast of Maitre Ile, from which its outer edge is a mile distant. Here the rocks suddenly terminate and the Ecreviere Bank, of gravel and sand, commences and extends nearly 2 miles farther southward.

Of the rocky reef described only those rocks used for sailinfg marks need special notice, viz, the Bigorne, Sabloniere, and Grande Galere.

Bigorne, a very remarkable horned rock, 24 feet above high water, lies 800 yards eastward of Maitre Ile. Sabloniere and Grande Galere, 350 and 550 yards northeastward of Bigorne, are not so high, but never cover.

Ecreviere Rock, the southeasternmost of the Ecrehos group, bearing 85° 1,600 yards from Maitre Ile, covers at high water springs.

The Ecreviere Bank extends 141° nearly 2 miles from the Ecreviere Rock to its southern edge in 5 fathoms. Its greatest breadth, near the northern end, is half a mile, and it tapers off to a width of about 400 yards at its southern extreme.

The bank is very steep along its western side. Its surface consists of a number of ridges of fine gravel and sand, convex to the southwestward, nearly parallel with and close to each other, many of them drying from 3 to 5 feet and separated only by narrow channels from 3 to 8 feet in depth.

The stream setting over this bank causes a confused sea in bad weather. Bigorne Rock and Tas de Pois, in line 310°, mark the direction of the southern end of the bank, and, by opening these objects of each other one point either way, the end of the bank may be rounded as necessary.

Grouville mill (without arms, as previously described), on with Orgueil Bluff, leads over the bank 500 yards within its southern extreme, where it is awash at low water. St. Martin's spire in line with the upper house on the northern side of Verclut Point, bearing 250°, or Rozel mill open southward of Coupe turret 255°, leads clear of its southern end.

Ronde Selhere, the southernmost of the Ecrehos Rocks, uncovers 7 feet; from it Marmotier Islet appears in line with the high eastern extreme of Maitre Ile, and St. Martin's spire open northward of Fliquet telegraph tower bears 240°.

Another and larger rock of similar character, but drying 8 feet, lies 350 yards northwestward of this; and a third, the Petite Noire, drying 13 feet, about the same distance northward, the three rocks forming nearly an equilateral triangle. A reef, awash at low water, lies 200 yards 51° of the Ronde Selhere, and a 4-foot patch half that distance 85° from it.

These rocks may be cleared on their southwestern side by shutting in Plemont Point behind Ronez Point. St. Martin's spire, in line with Fliquet telegraph tower, leads southward. Tas de Pois, on with the eastern side of Marmotier 327°, leads between Ronde Selhere and the Ecreviere Bank. To keep southward of the Grande Noire Rocks the whole of Petite Rousse Rocks must be well open southward of the high rocks of Maitre Ile. Bigorne Rock, seen midway between Sabloniere and Grande Galere Rocks 22°, clears the Ronde Selhere Rocks on their western side and leads up to the anchorage.

Maitre Ile Anchorage, for small vessels only, lies southward of Maitre Ile and within Ronde Selhere. The best berth is in a depth of 6 fathoms, gravel, with Marmotier houses open eastward of Maitre Ile 338° and Bigorne midway between Grande Galere and Sabloniere.

Large vessels should anchor in 8 fathoms, gravel, outside the line of Ronde Selhere Rocks and Ecreviere Bank, with Tas de Pois on with the eastern extreme of Marmotier 327°.

Nipple Rock forms the outer western corner of the western entrance to Maitre Ile inner anchorage. The rock near its center dries 16 feet. At this spot Grande Galere is open southward of Maitre Ile and Grosse Tete is well open westward of Colombier 341°. The Vraic, a rock which dries 5 feet, lies 94° 600 yards from the Nipple Rock. Sabloniere and Bigorne Rocks in line lead over the Vraic Rock.

The Demies are two rocks scarcely 200 yards apart, whose summits dry 18 and 19 feet and are just at the half-tide level. The outer rock bears 299° 1,200 yards from Nipple Rock and is nearly ½ mile westward of the Ecrehos main reef. From the outer Demie, Marmotier, open southward of the Cotes Rocks, bears 49°; the Vielle Rock is open northward of Colombier; and St. Martin's spire over the Coupe bears 229°. Several rocks uncover 300 yards westward of the Demies, and sunken dangers with only 5 feet water lie nearly 600 yards in that direction.

Ruquet Reef consists of several detached masses of sunken rocks on the northern side of the Ecrehos reef and separated from it by narrow deep channels. The highest rock of the eastern mass is awash at low water; from it St. Catherines Lighthouse, midway between the martello tower northward of Mont Orgueil and the end of the plateau above Gorey, bears 198°, and Maitre Ile Beacon, midway between Grosse Tete and the Vielle, 132°.

Petite Rousse Rock has three heads from 12 to 14 feet above high water and is on the northwestern side of the Ecrehos Reef, 265° 1,670 yards from Grosse Tete; the whole space between, except a narrow and tortuous channel, is choked with rocks, of which a great number uncover every tide. Dangerous rocks, of which some uncover and others are awash at low water, are thickly scattered over the space between the Petite Rousse and the Demies; others lie between 186° and 198°, extending 1,200 yards from the Petite Rousse, and one dangerous reef uncovers 3 feet 800 yards 217° from it. On its northern side also it is closely encumbered by rocks of which the Table Rock, which uncovers 23 feet at 500 yards distance in a 21° direction, is one of the principal.

Grande Rousse Rock is 22 feet above high water and bears 282° 1,200 yards from the Petite Rousse, from which it is divided by a narrow navigable channel, and, like the latter, is surrounded by dangerous reefs. St. Catherines Lighthouse, in line with the martello tower northward of Mont Orgueil 198°, leads between the Grande and Petite Rousse.

Tides.—It is high water, full and change, at the Ecrehos Rocks at 6 h. 32 m.; springs rise 31 feet, neaps 22½ feet.

The Drouilles.—This rocky group is about 3 miles westward of the main body of the Ecrehos and 3.5 miles northward of Coupe Point. It is about 2 miles in diameter and consists of broken detached reefs, the whole covering with the tide, except three small rocks near the southwestern side, of which the Burons are the two largest.

The Burons are two conical rocks about 7 feet above high water, and only a few yards apart. Although small, they are most useful marks to vessels navigating the Ruau Channel; 500 yards southwestward of the Burons is the Frouquie, a large rock 7 feet lower than the Burons and awash at high water.

The Joli is a small pinnacle rock, which dries 6 feet, 229° 1,400 yards from the greater Buron. From the rock Maitre Ile Beacon is in line with the middle of the Cotes and Rozel millhouse open eastward of the Tour de Rozel bears 181°.

The Hau is a rock with 12 feet water 187° 750 yards from the Joli; this rock forms the northern boundary of the Ruau Channel at its narrowest part.

Platte Rock is one of the largest of the Drouilles group; it is their southeastern boundary and forms the western side of the southern entrance to l'Etoc Channel. It dries 33 feet at low water, equinoctial springs. From the rock Rozel millhouse in line with Nez du Guet Fort bears 198° and the greater Buron 289°, distant 1,600 yards.

Among the less important rocks of the Drouilles Group are the Grese, which bears 338°, 900 yards from the Platte, and uncovers 29 feet; Noire Roque, 35°, 500 yards from the greater Buron, dries 33 feet; Clump Rock, marking the northern visible extreme of the group, dries 15 feet; and the Grunes, an extensive bed of rocks visible only near low water, ½ mile westward of Clump Rock.

The Kosem, the northernmost sunken rock of the group, has 12 feet over it at low water.

Le But, with only 8 feet water, is the western head of a group of rocks, of which several uncover from 4 to 6 feet. It bears west 1,650 yards from the greater Buron. Another rock, with 21 feet water, bears 268° 350 yards from Le But; this is the westernmost danger of the Drouilles.

Clearing marks.—Verclut Point shut in by Coupe Point or Rozel mill, just clear westward of millhouse and open westward of Tour de Rozel 171°, leads westward of the Drouilles. Maitre Ile Beacon open northeastward of Grosse Tete 119° clears their northern extreme. Seymour house and the breakwater house, Verclut Point, in line 185° clears their eastern side and leads through the Passe de l'Etoc. The Vielle and Grande Rousse Rocks in line 78° lead southward of them.

The Ruau Channel, between the Drouilles Rocks and Jersey, is at its narrowest part 2.3 miles wide, from 12 to 18 fathoms deep, and free from danger, but the confused sea, caused by a strong weather tide over the rocky, uneven bottom, is sometimes so violent as to resemble breakers.

The northern entrance to the Ruau, between the Drouilles and Pierres de Lecq, sometimes called the Drouilles Channel, is 4.5 miles wide and free from danger. The approach from the westward, between the Pierres de Lecq and Jersey, is also roomy and safe, and any seaman with a good chart may safely take his vessel through the Ruau Channel and into Gorey outer road without a pilot.

When the marks are indistinct, or at night, vessels should endeavor to keep in mid-channel when passing between the Pierres de Lecq and the Jersey coast and through the Ruau Channel.

Passe de l'Etoc is the principal passage between the Drouilles and Ecrehos Reefs; it leaves to the westward the whole of the Drouilles Rocks, and to the eastward the Grande Rousse, Etoc, and Fierco Rocks, besides the Grune du Nord-Ouest, Grune du Sud-Ouest, and many others. The narrowest part of the channel is between the Platte Rock and Grune du Sud-Ouest, where it is only 600 yards wide.

Grune du Sud-Ouest, on the eastern side of the southern entrance to the Passe de l'Etoc, bears 151° ½ mile from the highest part of the Platte Rock, and has 5 feet water. From the rock, Seymour House is a little open eastward of the Breakwater House under Verclut Point; and, Maitre Ile Beacon in line with the southern side of the Cotes Rock bears 94°. Another 5-foot rock bears 21° 330 yards, and, a third rock with 8 feet water, 450 yards east from the Grune du Sud-Ouest. A patch of 13 feet also lies on the western side of the leading mark for the Passe, distant 600 yards from the outer rock of the Grune du Sud-Ouest on a 261° bearing.

L'Etoc.—This rock, in the form of a saddle, uncovers 16 feet 63° nearly a mile from the highest part of the Platte Rock; and 25° 1 mile from the Grune du Sud-Ouest. From it, the highest heads of the Pierres de Lecq in line with the northern head of the Burons bear 265°: and the Martello Tower northward of Mont Orgueil on with the middle of St. Catherines Breakwater 189°.

The Fierco is near the middle of a reef of rocks, 600 yards in extent north and south, most of which never uncover; it lies 29° 600 yards from l'Etoc and uncovers 7 feet.

Grune du Nord-Ouest, with 7 feet water, is the shoalest rock of the northernmost reef on the eastern side of the Passe de l'Etoc.

It bears 32° 1.3 miles from the Platte Rock, and 350° about 1,400 yards from the Etoc, with Rozel millhouse open eastward of Nez due Guet Fort; and Grosse Tete Rock touching the southern end of Maitre Ile 122°.

Directions.—The best leading mark for the Passe de l'Etoc is Seymour house in line with the breakwater house at Verclut Point 185°; but, if from the southward, when passing abreast of Grune du Sud-Ouest, Seymour house may be brought a little westward of the breakwater house, provided that the leading line is regained immediately afterwards to avoid passing too near the Platte. The same may be done to give a good berth to a 7-foot rock which lies with Tas de Pois and the Etoc Rock in line.

The Passe de l'Etoc has a general depth of 8 fathoms, and the bottom, although very rocky, is tolerably regular; both tides, however, set across it for a considerable time, and no stranger should attempt to pass through without a pilot.

There is a 3½-fathom channel between the Grande and Petite Rousse Rocks, for which the leading mark to approach from the southward is St. Catherines Lighthouse in line with the martello tower of Mont Orgueil 198°, but it is in some places little more than 200 yards wide and studded with rocks; about half tide a vessel of 12-foot draft with a leading wind may safely pass through, but below half tide it is unsafe even for boats.

Giffard and Bonne Nuit Bays.—Fremont Point, a high bluff, is 1,600 yards westward of Belle Hougue Point; between them are these two small bays, divided from each other by Crete Point, on which is a fort. Giffard Bay, the easternmost of the two, is small, but the ground is clean.

Bonne Nuit Bay may be easily recognized by St. Johns Barracks, a long range of low buildings near the middle of it; also by Mont Mado mill, which stands on the high land above and westward of them. There is a small harbor for fishing boats on the western side of the bay. Near the middle of the bay, about 400 yards from the shore, is the Cheval, a large black rock which only covers at high spring tides, with several sunken rocks 100 yards outside it. A reef extends 500 yards northward from Fremont Point; at its outer extreme is the Demie, a rock which dries 16 feet.

Anchorage.—The best berth is about 500 yards northward of Crete Point, in a depth of from 6 to 8 fathoms, sand and gravel. A vessel here is well sheltered from southerly and westerly winds, but should be prepared to slip in case of a sudden shift of wind to the northward.

Shamrock Bank is a bed of rocks nearly 400 yards in extent. The least water, 9 feet, is at the southern part of the bank, and there are depths of from 6 to 12 fathoms close round it. From the 9-foot rock Fremont Point well open westward of the Demie Rock bears 150° 1,200 yards; Plemont Hotel is just within the outer part of Ronez Point; the western house of St. Johns Barracks is a little open eastward of Fremont Point; and Tour de Rozel is over the outer extreme of Belle Hougue Point 111°.

Plemont and Ronez Points in line 268° lead inshore of the Shamrock Bank, a close mark for the 9-foot patch.

St. Johns Bay, between Fremont and Ronez Points, is but a slight indentation of the coast; its shore is, moreover, so fringed with rocks as to be almost inaccessible, and outlying rocks extend in some parts nearly 400 yards from the shore, between which and the Shamrock Bank is a passage 800 yards wide. Strangers are advised, however, not to attempt passing through this channel without a pilot, nor to approach the land hereabout nearer than a mile.

This part of the coast is remarkable from the extensive granite quarries which add to its naturally barren and wild appearance.

Ronez, Sorel, and Plemont Points, unlike Belle Hougue and Grosnez Points, are all low at their outer extremes, but rise at rather steep inclines to the high, level plateau, which is the remarkable feature of the northern coast of the island, at distances of but little more than ¼ mile.

Ronez and Sorel Points are steep-to, but between and about 100 yards outside them is the Grune de Vicq, a sunken rock with only 3 feet water, which may be cleared on its northern side by keeping Lipende Point open of Ronez Point until Plaine Point is open of Sorel Point.

A quarry has lately been opened at Ronez and a small wooden jetty erected for the loading of stone; a large mooring buoy has been placed about 29° 200 yards of the extreme point.

On a hill near Ronez Point there is a flagstaff and an Admiralty semaphore station.

Plaine Point has a reef extending about 100 yards from it, outside of which, however, the point is steep-to.

From Plaine Point to Greve de Lecq the coast is bold, precipitous, and dangerous of approach, having outlying reefs and sunken rocks extending from 400 to 600 yards offshore.

Greve de Lecq Bay is near the middle of the bight between Sorel and Plemont Points; its position may be recognized at a distance by a whitewashed martello tower over the middle of its high, sandy beach. The anchorage off Greve de Lecq is good and safe with all except northerly winds; the best position is in from 6 to 9 fathoms, sand, with Greve de Lecq martello tower bearing between 164° and 192° from 800 to 1,200 yards distant; at the inner and western position Plemont Point is open of Grand Becquet Head. The dangers in or near Greve de Lecq are as follows:

The Demies, of which the higest dries 16 feet, 330 yards from the eastern headland of the bay and 12° 700 yards from the white martello tower. This rock is surrounded by others which dry at low water to the distance of 100 yards, and the ground between them and the shore is rocky and foul.

Grune de Becquet, with 21 feet water, bears 29° 1,150 yards from Grand Becquet Head. From the rock Grosnez Point, seen over the low point of Plemont, bears 261° and Greve de Lecq martello tower 170°.

Grune de Douet, with 12 feet water, is 670 yards inshore of the Grune de Becquet and 63° 600 yards from Grand Becquet Head.

Greve au Lancon Bay, between Plemont and Grosnez Points, is small but remarkable from its fine level white sandy beach, which, however, unlike Greve de Lecq, is entirely covered by the tide long before high water; at which time the sea rolls into the numerous caverns of the cliffs bounding the bay, cutting off all communication with the highland above and imparting a wild aspect to the coast. The dangers here are a rock which dries 14 feet 200 yards from the shore on the western side of the bay, and the reef extending a cable from Plemont Point which dries at low water.

Small vessels bound southward round Grosnez Point between half flood and half ebb, and, if unable to stem the tide, may advantageously anchor in this bay until half ebb, when the southern tide will have made and favor their proceeding through the swashway; or, if bound eastward between the Pierres de Lecq and the island and having anchored on the ebb, they can weigh at low water and carry a fair tide as far as Coupe Point.

The best anchorage is off the middle of the bay, with Grosnez Bluff bearing about 248°, in a depth of from 6 to 9 fathoms, sand, but the holding ground is not good and a sailing vessel approaching or leaving the bay must be prepared for unsteady flaws of wind from the highland and varying eddies of tide.

Caution.—No sailing vessel should anchor in any of the bays along the northern shore of Jersey with a northerly wind, but should a vessel be surprised at anchor by a sudden shift of wind to that quarter, it may be advisable not to weigh until the weather tide makes in order to insure getting out.

Pierres de Lecq or Paternosters is a rocky group, of which the western end in 5¼ fathoms bears 14° 2.7 miles from Grosnez Point; they are nearly abreast of Greve de Lecq Bay, and Great Rock, their central and highest head, bears 359° 2.7 miles from the white martello tower in that bay, and is about 35 feet above the high-water level. Three other large rocks which never cover lie near the middle but toward the southeastern side of the reef, one of them northeastward of the Great Rock, the other two southwestward of it. The reef dries in numerous places northwestward of the Great Rock for nearly a mile, and southeastward of it are rocky banks of which the outer one with 20 feet water is distant 1,200 yards. The most dangerous rock in this quarter is the Grune de Lecq, which dries 2 feet and bears 146° 900 yards from the Great Rock.

Clearing marks.—Corbiere Lighthouse in line with Pinnacle Point 178° leads between the Pierres de Lecq and the Banc Desormes. A nearer mark for the former is St. Peters mill on with Greve de Lecq flagstaff 146°. Tour de Rozel shut in behind Belle Hougue Point 111° leads southwestward of them; it must, however, be well shut in to clear the outer patch of the southwest Grune, on which the depth is 17 feet. The white tower in Greve de Lecq Bay on with the eastern point of that bay 215°, or the outer house on Grosnez in line with the apex of Plemont Point 231°, clears the southeastern side; and Rozel mill in line with the Colombiere Rock, eastward of Belle Hougue Point 132°, leads northeastward. If Rozel mill can not be made out, the whole of Jethou Island shut in behind Little Serk is a good mark for clearing the Pierres de Lecq on their northeastern side.

By night, St. Catherines Breakwater fixed white light kept opening and shutting in with Coupe Point 137° leads in mid channel between the Pierres de Lecq and the Drouilles.

General directions.—The necessity for taking regular and careful soundings can not be too deeply impressed on the mind of the mariner when approaching the Channel Islands, or when navigating among them at night or in thick weather; for, although the islands and reefs generally are steep-to, so that the lead may give little or no warning, it is possible for a vessel to be set inside their boundaries without seeing them, when a knowledge of the depth might enable her to anchor, and thus save the vessel. Mariners are also cautioned against placing dependence on making out the distant marks for outlying dangers, many of which can only be distinguished in very clear weather and by those acquainted with the localities.

Moreover, there are extensive banks of gravel and sand among the islands, as well as other occasional irregularities in the bottom, which the careful pilot would know how to turn to account in estimating his position; and on the French coast eastward of the islands the soundings are generally so regular that the lead may be taken as a safe guide in estimating distances from that shore.

When the position is uncertain and the lead is hove it is often useful to keep it on the ground for a minute or two in order to note the direction and strength of the tidal stream; for, as the streams vary considerably both in strength and direction, according to position, and as diagrams giving precise information on this subject are engraved on the charts, a reference to the chart with the knowledge thus gained may be very useful.

When the stream is running strongly, tide ripples and overfalls always make their appearance over sunken rocks, outlying banks, or other exposed places. In foggy weather, therefore, such indications may be turned to good account. In thick weather an anchor should always be ready when navigating among the islands; but before letting go, if possible, always turn the vessel's head to the tide, or there will be great danger of parting cable.

Approaches by night — From the westward. — Endeavor to make either the Hanois or Roches-Douvres Light and fix the position of the ship accurately by bearings before shaping a course for the Corbiere Light or for Grosnez Point, according to whether the vessel is proceeding by the southern or northern coast of Jersey. Should a vessel pass inside the line of these lights in thick weather without seeing them, the lead should be frequently hove until the Corbiere Light is seen and the position ascertained beyond doubt. On the meridian of the Hanois a depth of 34 fathoms will be obtained, shoaling to 32 and 30 fathoms along the Deroute Channel as far as Serk, while southward of a line drawn from the Roches-Douvres to Grosnez Point the depths are less, varying between 26 and 23 fathoms. If bound for St. Helier, when within 2 or 3 miles westward of the Corbiere it is safest to heave to and wait for daylight.

In thick weather do not approach the Corbiere into less than 17 or 18 fathoms, and lay the vessel's head 310° during the whole of the flood, as the stream sets strongly down toward the Minquiers, and many vessels have been lost on that reef through neglecting this precaution.

A steamer with a good pilot, in a fine clear night and during the upper half of the tide, may safely proceed from this position to St. Helier Harbor. Having brought the Corbiere Light to bear 74°, distant 2.5 or 2 miles, she should steer direct for Noirmont Point, which should be approached to about 500 yards; from thence she should steer 81° for the entrance of the Little Road, with La Greve d'Azette occulting white light and St. Clements fixed white light in line, keeping a lookout for the green and red leading lights on Albert Pier. When the latter are in line, 23°, they should be steered for until the two fixed green lights at the south end of the harbor are in line, 74°, which direction leads into the harbor between the pierheads.

From the southwest.—Do not approach the reefs fronting St. Aubin Bay into a less depth than 10 or 12 fathoms; should this depth be obtained and the vessel's position be doubtful, anchor, if practicable, and wait for daylight.

From the northwest.—From St. Peter Port, Guernsey, steer so as to enter the white sector of light on the Corbiere Rock on or eastward of a 147° bearing, and on a clear night the light will be seen shortly after passing St. Martins Point; take care to keep in this white sector, and if near its eastern limit when Grosnez Point bears 96° and it be desired to pass outside West Rock, on which, however, there is a depth of 6 fathoms, steer 198° until past it, after which steer to pass 2 or 3 miles westward of the Corbiere, where a vessel should heave to and wait for a pilot or for daylight.

Should there not be too much swell, a vessel could anchor for a time on the Great Bank in from 5 to 8 fathoms 310°, about 1.5 miles from Corbiere Light, or between this position and No. 3 martello tower in St. Ouen Bay, where the water is generally smoother and the tide stream not so strong.

From the northward.—Having made Cape de la Hague Light, enter the Race of Alderney as near mid-channel as possible, and from thence steer 175° or 198°, according to the state of the tide, passing 4 or 5 miles eastward of the Banc de la Schole. Should the weather be clear, the position of the ship may be ascertained and the course regulated by the coast lights with accuracy. If the lights are obscured, it is best not to enter the Race until daylight; but if compelled to do so, remember that a moderate depth and good anchorage may always be secured by hauling in toward the French coast.

Should there be too much swell to anchor and the weather be moderately clear, Serk is very steep-to and safe of approach, except on a northwesterly bearing, in the direction of the Blanchard Rock. During the upper half of the tide, if it is desired to maintain a position near Serk, bring the middle of that island to bear 209°, and during the lower half 6°; in calm weather the drift will then be away from the island.

From the middle of the Race toward the eastern coast of Jersey, to pass through the Drouilles Channel, steer as just directed until Cape Carteret Light bears about 85°. St. Catherines Light should now be seen if the weather is clear, and, kept opening and shutting in with Coupe Point 137°, it leads eastward of the Pierres de Lecq and nearly midway between the Drouilles and Belle Hougue Point. When inside the Drouilles open St. Catherine's Light of Coupe Point and do not approach Jersey nearer than a mile; after passing the light bring it to bear 310° from 1 to 1.5 miles distant and anchor in a depth of about 9 fathoms until daylight.

Should St. Catherines Light not be seen when Cape de Carteret Light bears 85°, proceed with caution, bearing in mind that from the northernmost of the Pierres de Lecq Cape de Carteret Light bears east and that a line drawn from the one to the other clears the northern extreme of the Drouilles Reef by nearly a mile. The Drouilles are all so low that they would hardly be seen at night until a vessel was among them, but as they are faced on their northern side by a fringe of sunken reef or bank, the lead, if carefully attended to, should give warning of their neighborhood.

The Pierres de Lecq being steep-to on the eastern side and some part of the rocks always visible are much safer to approach at night than the Drouilles. Of course neither these nor any other dangers should be approached under circumstances of difficulty with the tide. Grosnez Bluff bearing 243° just clears the inner or southern edge of the Pierres de Lecq Reef.

If bound through the Deroute Channel round the western coast of Jersey, from the middle of the Race steer 175° or 198°, as before directed, until Cape de Carteret Light bears 96°, to clear the Blanchard Rock off Serk; then haul out westward into the Deroute Channel clear of the Pierres de Lecq and of the Banc Desormes, and when the Corbiere white light is in sight bearing 147° a 175° course may be steered until within 2 or 3 miles abreast of the Corbiere Rock, where a vessel should heave to and wait for daylight or act as already directed in coming from the westward.

Tidal streams.—Along the northern and southern shores of Jersey, between Grosnez Point and Belle Hougue Point on the north, and between Corbiere Rock and Seymour Tower on the south, the whole of the flood stream runs eastward and the ebb westward, following the trend of the land, and each tide running for 6 hours, the velocity at springs being about 4 knots and at neaps about 2 knots.

In Grouville, St. Catherine, and St. Ouen Bays the stream runs northward between half flood and half ebb and southward between half ebb and half flood, with a velocity in each case of 4½ knots at springs and 2½ knots at neaps; the streams consequently meet off the four extremes of the island, viz, Coupe Point, Grosnez Point, Corbiere Point, and the Conchiere Rock.

The rotary changes of direction of the tidal stream round Jersey being the governing cause of the various sets close to its shores, some description of its action is necessary. Assuming therefore the time of high water and a position about 4 miles southwestward of St. Helier, the stream which has been hitherto setting southeast by east and east by north now quickly alters its direction to northeast by north, which a glance at the chart will show is full on to the southern coast of the island, making the space included between the assumed position and the land what pilots call the crown of the tide, and causing slack water as the shore is approached.

The northern side of the island at this time lying in the lee or eddy, slack water is caused there also, but along the eastern and western coasts, the tide is setting northward at its full strength. At half ebb, the offing stream has veered round from north to northwest by west and southwest by south; the crown of the tide is now on the eastern side of Jersey and the western side is in the lee or eddy, causing slack water at this time in Grouville and St. Ouen Bays at the opposite ends of the island, the stream at the same time running at its full strength westward along the northern and southern coasts of the island. At low water the stream is setting from the northward on to the northern shore of Jersey, making the crown of the tide on that side and the lee on the southern side of the island, causing slack water on those sides while the stream is running with its full strength southward along the eastern and western sides. At half flood the crown of the tide is on the western coast, the lee on the eastern side with slack water on those sides, while the stream is setting with its full strength eastward along the northern and southern shores.

A careful consideration of this rotary action of the tidal stream serves to explain all peculiarities of the tides in the bays of the island. Thus at Noirmont Point near half flood, when the eastern stream attains its full strength, there is an outset from St. Aubin Bay, which runs with considerable strength between Pointe de But and the Pignonet Rocks, and is perceptible within the bay as far as St. Aubin Castle; at first this is a mere eddy of the flood stream originating under Noirmont Point, but as, after half flood, the stream shifts from east by north to northeast by north and sets right on the Hermitage Rocks and Elizabeth Castle, the very gentle incline of the sandy shore here and the great space to be covered causes the level of the sea at this part of the bay to be considerably raised above that of the western side, and the water necessarily runs off in the direction of the lower level.

On referring to the chart it will be seen that the form of the bay tends to deflect the stream from a northeasterly to a northerly direction. It is not therefore difficult to understand why the small eddy under Noirmont Point, when reenforced by the westerly flow around the head of the bay, becomes the continuous outset from Noirmont Point just described. This outset runs for 9 hours, viz, from half flood to high water and during the whole of the ebb. It attains its greatest strength about an hour after high water, and at this time, during a westerly gale at spring tides, it throws up a dangerous breaking sea or race off Noirmont Point.

From similar causes, viz, the shifting and impinging on the land of the offing stream, the tide sets northward across the mouth as well as into the harbor of St. Helier during the whole of the flood and southward during the ebb, except near the Bridge inside Elizabeth Castle, where the tide sets northwestward from the last quarter flood until the bridge is awash at 1 foot below half tide.

In the offing, southwestward and clear of the island, the strength of each tidal stream runs fairly northwest by west or southeast by east, remaining longer near those points than any other, and it has been already shown that near high water it quickly changes its course to east by north and northeast by north, at this latter point running full on the island and making high water there. It does not, however, continue in this direction for any length of time, but veers around by north to a northwesterly direction, where its shifting movement is much slower. The strength of this northwestern stream is felt at half ebb on the southern coast of Jersey. To arrive at a right understanding of the force and effect of the ocean swell along the southern coast of Jersey in westerly gales it is necessary to follow this changing direction of the offing stream.

An hour before high water, on the slacking of the southeastern stream in the offing, the western stream sets around Noirmont Point to the westward, checking the advancing westerly swell during gales from that quarter and causing it to break heavily. As this natural breakwater forms off Noirmont Point and its outlying reefs, the water within and to leeward, both in St. Aubin Bay and St. Helier Road, becomes smoother, and as the western or ebb stream increases in strength so does the swell continue to decrease. After the tide has fallen below half ebb, the outlying reefs, gradually uncovering, assist materially in blocking out the swell, but after low water the offing stream changes and the westerly swell rolls in again with the eastern stream, increasing in force with the rising tide, until again checked by the slacking of the offing stream and the making of the western stream inshore.

CHAPTER VII.

CHANNEL ISLANDS — GUERNSEY, HERM, AND SERK, WITH THE RUSSEL CHANNELS.

General remarks.—In the opening pages of the preceding chapter the appearance of Guernsey, when first sighted from the westward, as contrasted with Jersey, is fully described, and general information given on the approaches to the Channel Islands, as well as on the peculiarities of wind and weather, soundings, and tides, so far as the islands generally are affected.

Tides, etc.—A detailed description of Guernsey, Herm, and Serk now follows; and it may be well here to remark that the depths as well as heights on the chart of Guernsey are reckoned from a zero of low-water mean springs. The lowest tide registered at Guernsey from 1858 to 1868 fell 3 feet 9 inches below that zero. On February 10, 1887, the lowest tide on record took place, the tide falling 4 feet 6 inches below the zero, and the range of the same tide being 33 feet 6 inches. The least range of tide recorded in Guernsey is 6 feet; it took place both on April 7 and September 16, 1858.

Guernsey.—The most remarkable objects which first present themselves when running for the southwestern end of Guernsey are, the lighthouse on the Hanois Rocks; the white castellated tower of Fort Grey in the sandy bay of Rocquaine; Guet de Pleinmont or Pleinmont guardhouse, on the heights southward of the bay near the bluff; Torteval Church, with its round tower and high steeple, a little distance inland and as conspicuous in this part of the island as Catel and Vale Churches are in the northern and eastern parts; and Eree Tower, on a hummock at the northern part of Rocquaine Bay, near Lihou Island.

As the coast is approached, the northern part of the island sloping gradually northward from the high southern plateau begins to rise above the horizon, presenting a surface diversified with houses, churches, windmills, and groups of trees, all of which become still more conspicuous if seen from a northwesterly direction.

The western shore of Guernsey is studded with precipitous rocks, of which many are wholly detached from the shore. On the high land above St. Martins Point at the southeastern end of the island is a stone column, erected in honor of Lieut. Gen. Sir John Doyle; it is 96 feet high, with its summit 384 feet above the level of high water. Another remarkable object is the Victoria Tower, 100 feet high, and its summit 301 feet above high water, erected on the heights above St. Peter Port to commemorate the visit of Her Majesty Queen Victoria in 1846. It is a square tower, slightly tapering from its base, surmounted by a battlemented gallery, with square turrets at its angles.

The island of Guernsey is nearly in the form of a right-angled triangle, the northwestern side forming the hypothenuse, the length of which is about 8 miles. The land on the southern side is high and steep, its average height being about 300 feet; the highest part is Hautnez, over Icart Bay, which is 337 feet above the level of high water, but it gradually lowers toward the north, where in some places it is little above the sea level. The island is encompassed by many dangerous rocks, of which the principal are the Hanois, Sambule, and Grunes, on the western and northwestern sides; the Braye Rocks with several others on the northern side; and on the northeastern and eastern sides lie the Amfroque Rocks, together with the islands of Herm and Jethou, which are also themselves surrounded by numerous rocks and ledges.

Guernsey contains 16,000 acres of fertile and highly cultivated land; its population in 1911, including Herm 25 and Jethou 3, was 45,001. The island does not grow grain enough nor raise a sufficient number of cattle to supply its inhabitants.

Approach from the westward.—Vessels bound to Guernsey from the westward should not approach the island in thick weather within a depth of 40 or 38 fathoms unless certain of their position. Careful allowance should also be made for the flood stream setting in toward the island.

The water is deep 400 yards westward of Hanois Lighthouse, but from it dangerous rocks extend 196° 700 yards, 321° 1,500 yards, and 344° 1 mile. The Grunes de l'Ouest, or du Nord-Ouest, are a group of rocks, the highest of which dries 10 feet at low water springs and bears 33° 5 miles from Hanois Lighthouse. Several sunken rocks, on which the sea breaks heavily in bad weather, lie outside and westward of the Grunes du Nord-Ouest, of which Boue Blondel, the most western, has only 5¼ fathoms water from the lighthouse 1° nearly 3.7 miles. It is therefore recommended, in order to clear all these dangers, that vessels from the south or west passing westward of Guernsey at night should not bring Hanois light westward of south until the Casquets light bears 51°.

Anchorages.—Rocquaine and Perelle Bays, on the western coast of Guernsey, are so surrounded by rocks as to be made unsafe of approach for any but the smallest vessels. There are, however, several anchorages on the southern side, especially at Icart and Petit

Port Bays, where, with an offshore wind, a vessel may stop for a tide; but even they are not safe for a stranger to approach, and no vessel without a pilot should close the southern coast so as to shut in the North Point of Serk with Jerbourg Bluff.

St. Peter Port Road, on the eastern side of the island, affords good shelter except with the wind between 198° and 119°, and the holding ground is excellent.

There is also good anchorage at the northern end of the Great Bank, on the eastern side of the island, as well as on the northern coast off Fort Doyle, and in l'Ancresse, Grand Havre, Cobo, and Vazon Bays, but at most of these places it is necessary to employ a pilot.

Pilotage.—By ordinance of the royal court of Guernsey it is enacted, under penalty of a fine, at the discretion of the court, that every pilot boat shall carry a flag, half red and half white, the white part uppermost, the letter P to be marked in black on the white part and the pilot's number in white on the red part near the center of the flag; and that every ship above 25 tons register carrying passengers, and every ship above 40 tons register, also every steamer with or without passengers shall take a pilot, both on her arrival in this island and on her departure, on pain of a fine of not less than $25; and shall further take the pilot who shall first have presented himself, on pain of a fine of not less than $2.50 and of paying, besides, the pilotage which would be due to the said pilot if he had accepted his services.

British naval vessels and yachts are excepted, also ships and steamers arriving from sea and anchoring in the roadstead on account of bad weather. In case a pilot, through rough weather, is prevented from getting on board a ship at sea, the master of the said ship and the pilot shall so manage that the pilot boat shall take the lead and serve as a guide, and the said ship shall pay the same pilotage as if the pilot had actually gone on board.

Beacons.—When beacons marking rocks in the vicinity of Guernsey require renewing each beacon is, as far as possible, capped with the initial letter of the name of the rock on which it stands. The letters on the beacons are painted black.

Tidal streams.—The eastern or flood stream makes close inshore soon after low water along the southern and northwestern coasts of Guernsey, while the southwestern stream is still running at its strength in the offing 4 miles westward of the island; between these positions the streams vary in strength and direction as one or the other is approached.

The flood stream between Guernsey and the rocks projecting from the southwestern end of Jethou Island takes two different directions; one part runs directly through the Great Road and Little Russel

Channel; the other branches off nearly at right angles and runs eastward toward Jethou, passing through the before-mentioned rocks and into the Great Russel. The ebb stream takes exactly the reverse direction, the stream from the Great Russel, after having passed through the rocks of Jethou, uniting with that through the road, and both setting southwestward. With Grande Braye Rock a boat's length open westward of Brehon Tower a vessel keeps in the stream which sets through the road and Little Russel, but the Grande Braye in line with Brehon Tower places her in the indraft of the Great Russel. A vessel working into Guernsey Road from the southward derives great advantage by paying attention to this division of the stream.

It is high water in the Great and Little Russel Channels at the same time as at St. Peter Port, viz, at 6h. 37 m., full and change, the last half of the falling and the first half of the rising tide occurring with the southwestern stream, and the last half of the rising and first half of the falling tide with the northeastern stream. In other words, at low water by the shore at St. Peter Port the southwestern stream has been running nearly three hours and is at its full strength, and at high water by the shore the northeastern stream has been running nearly three hours and is also at its full strength. Thus, off the eastern end of the island, the streams turn at about half tide by the shore and run nearly five and one-half hours each way, allowing something more than a quarter of an hour for the slack at each change of stream. In the Great Russel the strength of the northeastern stream runs northeast by east and of the southwestern stream southwest by west, and in the Little Russel the direction of the two streams at their greatest strength is 35° and 215° nearly. At the northeastern entrance of the Little Russel, however, between the Braye and Amfroque Rocks, it takes the direction of the offing stream, viz, the first two hours of the flood it sets directly for the northern end of Herm Island, gradually joining the southwestern stream through the Russel, and the last hour of the flood as well as the first of the ebb joining the northeastern stream.

To understand the various sets of the tides in the Russel Channels and around the outer shores of this group of islands it is necessary to consider their governing cause, viz, the rotary change of direction in the offing stream, which in one tide runs in regular succession from every point of the compass.

At high water by the shore, as just shown, the stream is setting northeast by east fairly through the Russel Channels and is then at its greatest strength, coinciding nearly with the general direction of the offing stream, which, at this time, westward of Guernsey is running east-northeast and eastward of Serk north by east. Three hours after high water, or at half ebb, the direction of the offing stream in its progressive change from north to west, etc., is about northwest, which a glance at the chart will show to be right about across the northern entrance of the Russel Channels, producing, as might be expected, a slack tide in the Great Russel under the lee of Serk, and still more so in the Little Russel, protected as it is by Herm, Jethou, and the numerous rocks northward and southward of those islands. At low water the offing stream has got around to 231°, and as this is about the direction of the Russel Channels the southwestern stream at this time attains its greatest strength.

After low water the island of Guernsey appears to obstruct somewhat the free course of the main stream into the channels eastward of it; and at half flood, partly owing to this obstruction and partly to the rising waters at the northern and southern ends of the island being pretty evenly balanced, and notwithstanding the strong easterly stream along its northern and southern shores, slack water prevails throughout the whole extent of the Russel Channels. The rising tide on the southern side gradually prevailing, causes the northeastern stream through these channels, attaining its greatest strength, as before stated, near high water.

Consideration of the foregoing general remarks is necessary in order to understand the great diversity in the set of streams and eddies about these islands. It must be also remembered that a body of water once set in motion continues to move onward for some time after the removal of the originating force; thus the Russel streams continue to run southwestward for some time after the source of supply has been cut off and until the greater and more rapid rise of tide southward of Guernsey causes a reversal of the stream. The southwesterly streams, when they meet the first of the eastern stream off St. Martins Point, blend with it and make a southeastern stream, which at springs runs with considerable strength from the northern end of the Great Bank southeastward for some distance outside the Tetes d'Aval, but is not felt inside the Great Bank nor near St. Martins Point.

The value of a thorough knowledge of the tides may be illustrated by following the track of a Guernsey boatman on a trip to the eastern side of Serk and back. He will take a fair tide the whole distance. Leaving Guernsey road a little after low water he proceeds with a fair tide to the southeast by east outside the Tetes d'Aval until he meets the eastern stream, with which he sails southward of Serk. Near l'Etac de Serk he runs into a northerly stream, which accompanies him along the eastern side of the island as far as Le Creux. On his return to Guernsey he will round the northern point of Serk about an hour after high water, at which time the turning of the offing stream toward the north removes the pressure of the Great

Russel stream from the Bec du Nez and causes an eddy from it to the Givaude Rock off Brecqhou, and he will carry an eddy or counter stream as far as the Givaude Rock, outside of which he will meet the true stream setting northwestward at 2 hours after high water. Going with this stream, he will pass through the Passe Percee and, crossing the Little Russel, arrive at St. Peter Port before the southwestern stream has fairly made.

Close to the coasts of the Channel Islands, as well as in the offing outside them, the general drift of the tidal stream appears to correspond with its rotary motion from right to left, for it has frequently happened that floating objects near the shore have been seen successively on their northern, western, southern, and eastern coasts. Moreover, part of a wrecked vessel having drifted from a rock near the Casquets during calm weather was known to take a southwesterly course and to drift with a rotary motion through a succession of parabolic tidal curves at the rate of about 4 miles per day, round the western and southern coasts of Guernsey, several miles distant from the island, and up the Deroute and Race streams; while other parts of the same wreck, having probably drifted off the rock at the commencement of the western stream, and having therefore been set farther out westward, were met with about the same time several miles within and eastward of the Roches-Douvres.

Such examples prove the existence of a drift which coincides with the shifting movement of the tidal stream; southwesterly from the Casquets, southerly past Guernsey, easterly and southerly between Guernsey and the Roches-Douvres, and northerly when eastward of the islands. The easterly and main branch of this drift, as already noticed, passes up the Deroute and Race Channels, and it seems highly probable that after clearing the Race of Alderney it turns off westward past that island, reunites with its own stream again off the Casquets, and repeats the same round as before in endless succession. This drift, commonly known as the "indraft of the Gulf of St. Malo," was formerly supposed to exist only during fresh westerly breezes, and doubtless its strength is greatly increased at such times, but there is now no doubt that between the Casquets and the Roches-Douvres it is continuous, and with a rate proportioned to the strength of the tidal stream.

These facts serve to show that vessels going round the islands, as well as those navigating the channels between them, may occasionally shorten their passages materially by following the curves of the tidal streams instead of taking direct courses.

Caution.—Although the northeastern stream begins to set through the Little Russel at the same time as through the Great Russel, viz, at half tide, it has no northern inclination around St. Martins Point until 4 hours flood; care must be taken therefore that the first of the eastern stream does not draw the vessel into the Great Russel or among the rocks in the vicinity of the Tetes d'Aval.

Hanois Light.—From a circular gray granite lighthouse with black top, 117 feet high, on the Bise Rock, the southwestern rock of the Hanois group, 1 mile off the western end of Guernsey, is exhibited, at an elevation of 100 feet above high water, a revolving white light, visible 16 miles all around the horizon, except when obscured by the Island of Guernsey; the line of eclipse in this latter direction passes 3⅜ miles southwestward of the l'Etac de Serk. From Hanois Lighthouse Casquets Lighthouse bears 36° 21.5 miles; Corbiere Lighthouse, Jersey, 130° 23.5 miles; and Roches-Dôuvres Lighthouse 192° 20 miles.

Fog signal.—An explosive fog signal is given at Hanois Light Station, in addition to which is a bell sounded at the lighthouse in thick or foggy weather.

The rocks and shoals of the Hanois group are more particularly included and described under the head of "Rocquaine Bay," in the following pages, a brief description of the outer dangers in approaching the northwestern coast of Guernsey being first given.

Outer dangers off the northwest coast.—The northwestern side of Guernsey should not be approached nearer than 3.5 miles, several dangerous rocky ledges lying off it, of which those most to be feared are the Grande Etacre, Sambule, Soufleurese, and Boin, and the Grunes de l'Ouest or du Nord-Ouest. The Grande Etacre dries 19 feet at low-water springs; the Sambule, 16 feet; the Soufleurese, 10 feet; the Boin, 3 feet; and the Grunes de l'Ouest, 10 feet.

From the outer head of the Grunes de l'Ouest, which is 2 miles from the island shore, Catel spire, just open eastward of Guet du Catel, bears 139°, and Hanois Lighthouse in line with the rock off the western end of Lihou Island, next within Corner Rock, 213° 5 miles, nearly.

From the Sambule, which is 1.5 miles from the shore, Catel Church, on line with Vazon Tower, bears 113°; St. Saviour's Church is in line with the Conchee Rock, and Hanois Lighthouse is just open westward of Corner Rock.

Grande Etacre.—The Grande Etacre is ½ mile northwestward of Lihou Island. From its highest head St. Peter's Church, which has a square tower and no spire, over the western part of Lihou Island, bears 133°; Vazon Tower, touching the southern side of Gros Pont, 88°; and Hanois Lighthouse, just open eastward of the Pendante, 203°.

As before described, several dangerous sunken rocks, on which the sea breaks heavily in bad weather, lie considerably outside the above dangers. Of these the principal are Boue Blondel, with 5¼ fathoms, from which Hanois Lighthouse bears 181° nearly 3.7 miles, and Torteval Spire, over the western part of Lihou Island, 150°, distant 2.3 miles from the latter. The inner head of the Roques aux Bois, of 5¾ fathoms, with Catel Church, the Guet du Catel, and the outer and highest head of the Grunes de l'Ouest in line 139°, 1,450 yards from the latter. The outer head of the Frettes, of 5½ fathoms, with Catel Church just open eastward of Grand Roque Tower, 161° 2.8 miles from the tower. The Platte Pierre, halfway between Boue Blondel and the inner head of the Roques aux Bois, although with 11 fathoms water, also breaks heavily.

Hanois Lighthouse, open westward of the Pendante, the outer rock of the Trois Peres group, 202°, leads over the outer part of the Roques aux Bois, inside the Platte Pierre and Boue Blondel, and outside the Grunes de l'Ouest, Sambule, Boin, Flabet, Boue Sarre, and Grande Etacre. Unless a vessel is well under command and in charge of a pilot she should not approach these rocks nearer than 2 miles.

Rocquaine Bay, between Lihou Island on the north and the Grosse Rock on the south, is 1.5 miles wide. It is fronted by numerous groups of rocks, as well as by isolated ones, of which many are always above water. A far greater number uncover with the falling tide, and sunken rocks are still more numerous. The bay is only used by fishermen of the neighborhood, or occasionally by vessels prepared to take the beach.

Depths.—The anchorage in this bay is in from 15 to 17 feet; it is well sheltered from northerly, easterly, and southerly winds, but westerly winds send in such a heavy sea, especially between half flood and half ebb, that no sailing vessel could work out against them. The holding ground, consisting generally of fine gravel and sand covered with grass and seaweed, is not good; nevertheless, in the southwestern part of the bay off Pezerie Point, a vessel of 12 or 13 feet draft, well moored, would ride securely all the year round in about 23 feet water under any circumstances of wind and weather.

Hanois Group.—The most remarkable rocks, which never cover, bounding Rocquaine Bay westward and southward, are the Mauve, 22 feet above high water; the Bise, on which the Hanois Lighthouse stands; Grand Hanois, 44 feet above high water; Petit Hanois; Hayes Rock, 3 feet only above high water; Percee, 7 feet; Round Rock, 25 feet; and Grosse Rock, 43 feet above high water.

Trois Peres Bank comprises the largest and most conspicuous group of rocks in the northern part of Rocquaine Bay; the Pendante, its outer rock, is 24 feet above high water and bears 248° 1 mile from Lihou lower house. The other Trois Peres Rocks are about the same height, but nearly 200 yards within the Pendante. Rocks from 2 to 15 feet above high water are also on the eastern and northern fronts of this reef.

A 15-foot passage exists between the Trois Peres Bank and Lihou Island, for which the leading mark is Torteval spire in line with the northeastern side of Fort Grey, but neither this nor any other passage into Rocquaine Bay should be attempted without a pilot.

Hanois Bank, from 1,100 to 1,600 yards westward of the Pendante Rocks, extends 300° and 120° about ½ mile, and Haut Fourquie, its highest rock, lying on its southeastern part and dries 10 feet; two other rocks dry 5 feet near its northwestern extreme. The outer sunken rock of the bank has 6 feet over it at low water; the marks for it are Tas de Pois d'Aval in line with the inner part of the Percee Rock 134°; and Guet du Catel well open southward of the Grande Battue Rock, Trois Peres Bank, and just southward of the lower house on Lihou Island east. Guet du Catel in line with Lihou watch house 75° leads 250 yards northward of the bank.

Banc Bise, the westernmost danger off Guernsey, extends 800 yards in a northwesterly direction outside the Mauve, which rock is always well above water; it is connected with the Mauve by a chain of sunken rocks, as the Mauve is with the Bise Rock, on which Hanois Lighthouse stands. The outer sunken rock, with 15 feet water, bears 316° 1,450 yards from the lighthouse; from it the lighthouse is just open westward of the head of the Mauve and Lihou watch house over the middle of the Trois Peres bears 61°.

Clearing marks.—Guet du Catel and Lihou watch house in line 75° lead northward of all the dangers fronting Rocquaine Bay, and Tas de Pois just shut in with Corbiere Point 96° leads southward.

Directions.—To enter Rocquaine Bay from the southward inside Hayes Rock, bring Corner Rock, the outer high-water rock off Lihou Island, in line with Nipple Rock, which dries 25 feet and is therefore covered by only 1 foot at high water, bearing 11°, and run in until abreast of the Percee Rock, when Black Rock will come in line with a remarkable rock on Lihou Saddle; this mark leads to a good anchorage in 4 fathoms a little beyond the Nipple Rock.

To anchor off the Torquetil Rock in 2½ fathoms, quit the leading mark just given when Cacquerau House is in line with the northern side of the Torqueil 66°, and steer in with this mark until Fort Grey comes on with Braye Rock, when Cacquerau House must be opened a little northward of the Torquetil to clear a 4-foot rock; after passing which anchor as convenient. The mark for entering the inner anchorage off Pezerie Point is Apex House, southward of Caudre Mill, on with the northern tangent of Fort Grey, but on account of the narrowness of the channel, no stranger should attempt to approach this anchorage except in the hands of a skillful pilot.

The leading mark from seaward between Lihou Island and the Trois Peres Bank, already given, Torteval spire on with the northeastern corner of Fort Grey, leads in safely as far as the Fourquie, a rock which dries 17 feet and must be passed very closely, leaving it on the port hand, after which rocks are numerous and the chart is the best guide.

A vessel may pass safely between Hanois Bank and the Aiguillons by keeping Torteval Church in line with the southwestern side of Round Rock 112°; after passing the Aiguillons, she may open Torteval Church a little southwestward of Round Rock, and after passing the latter, enter Rocquaine Bay by the leading marks already given from the southward.

There is no ship channel into Rocquaine Bay between the Trois Peres and Hanois Banks.

Dangers off the south coast.—The outer shoal off the southern shore of Guernsey, Boues des Kaines, is 1,500 yards from the shore. Serk Church open of Jerbourg Point 82° leads southward of all dangers up to Icart Bay. Pleinmont Ledge has 9 feet on the shoalest part, which bears 208° 1,200 yards from Pleinmont guardhouse, but is only 700 yards outside the Herpin Rock.

Boue Baker, with 16 feet at low water, is 1,100 yards offshore; from it the Round Rock is just shut in with Pleinmont Point and Torteval spire is in line with the northern part of a remarkable projecting bluff, marked by a white spot in the bay beneath it, bearing 30°.

The Boues des Kaines, with 29 feet at low water, lie with the extreme of La Moye Point in line with the inner guardhouse on Icart Point, Torteval spire just in sight above the cliff, and one point open westward of Guet du Tielle, 348°, and Grand Hanois within the Tas de Pois d'Aval, and in line with Pleinmont Point, 306°.

Inshore of these rocks are many others, of which some uncover at or near low water, as the Kaines d'Amont, which lie south-southwestward from Guet du Tielle and 800 yards from the shore; the Lieuses, which dry 8 feet and are 870 yards from the land southwestward of Corbiere Point; and the Sept Boues, 400 yards inshore of the Lieuses, which dry 10 feet.

Icart and Petit Port Bays, on the southern side of Guernsey, afford good anchorage and shelter during easterly or northerly winds. Petit Port, being the easiest of access, is by far the better of the two; the ground is clean fine white sand, and any depth from 5 to 9 fathoms may be chosen, but a sailing vessel at anchor in either bay should be in readiness to put to sea immediately a shift of wind renders it necessary.

In entering Icart Bay the Rousse Rock, which dries 20 feet 200 yards southward of La Moye Point, as well as the Balleine Rock, awash at low water, 250 yards 231° of Icart Point, must be avoided. In the center of the bay is the Fourquie de la Moye, which dries 8 feet, and near the western shore the Vieux Poulain, which dries 23 feet. The best anchorage is between, but inshore of, these rocks in a depth of about 7 fathoms sand.

The only danger in entering Petit Port Bay is the Banc du Petit Port, with 12 feet water. It lies 243° 270 yards from the outer rock off Jerbourg Point; to clear it in entering from the eastward keep Sommeilleuse guardhouse in transit with Icart Point 289°. Doyles Column in line with the peak of the rocky bluff 42° is the leading mark in. The Mouilliere, a dangerous rock, with only 4 feet over it at high-water springs, lies nearly in the center of the bay, with Doyles Column, just inside the inner end of the cliffs on the eastern side of the sandy beach under it, bearing 57° and Jerbourg Point 144° 670 yards.

Dangers off the east coast.—The dangers to be avoided in and after rounding St. Martins Point, the southeastern extreme of Guernsey, are the Grunes de Jerbourg, the Longue Pierre, Gabrielle, Piette, Anfre, and other rocks in the vicinity of St. Peter Port, as well as the shoaler parts of the Great Bank.

Grunes de Jerbourg are a dangerous cluster of rocks extending 500 yards in a 141° direction from Jerbourg Point, their outer extreme bearing about 209° from St. Martins Point; they cover at the first quarter flood and have a depth of 26 fathoms close to their southern side. The Fourquie Rock, lying in line between the southeastern extreme of the Grunes de Jerbourg and St. Martins Point, dries 5 feet.

Longue Pierre—Beacon.—The Longue Pierre dries 19 feet at low-water springs; it is 300 yards eastward from St. Martins Point and is marked by a black staff and skeleton ball beacon, with the letters "L P" below the ball. From it Castle Cornet Breakwater Lighthouse bears 1° nearly 2 miles.

The Gabrielle Rock dries 4 feet at low water, and is 400 yards offshore eastward of the Bec du Nez, 530 yards 355° from the Longue Pierre Beacon, and about 100 yards inshore of a line drawn between the Anfre and Longue Pierre Beacons; from it Saumarez monument is just shut in with the northeastern angle of Castle Cornet.

Anfre Rock—Beacon.—The Anfre Rock, marked by a black pole beacon surmounted by the letter "A," dries 8 feet and bears 1° from the Longue Pierre Beacon, distant rather more than a mile from it and 650 yards from the shore. The Piette is an 18-foot patch about 200 yards 141° of the Anfre.

Moulinet Rock—Beacon.—The Moulinet Rock is ½ mile 355° of the Anfre Rock, scarcely 400 yards from the shore, and also less than 400 yards southward of Castle Cornet; on it is a black beacon consisting of a pole surmounted by a barrel and a bird, with the letter "M" beneath the barrel.

Northward of the Moulinet and close to Castle Cornet are the Oyster, Ferico, and Tremies Rocks. The Oyster Rock dries 12 feet nearly 200 yards 130° of the castle, and the Tremies are scarcely 100 yards southward from the breakwater lighthouse.

The Ferico, the most dangerous of these rocks, with only 9 feet water, lies 300 yards 91° from the southern end of the Castle and in the fairway of vessels bound to St. Peter Port from the southward. To pass eastward of it, keep St. Martins Barracks open eastward of the Anfre Beacon until the cupola of the G. W. Railway offices on White Rock Pier is open of Castle Cornet Breakwater end, or bring Castle Cornet Breakwater Lighthouse to bear 313° when nearing it, which bearing also clears the Forein Rock, of 20 feet water, nearly 200 yards 127° of the Ferico.

The Great Bank lies nearly parallel with the eastern shore of Guernsey, its southwestern edge being 1,200 yards distant from Bec du Nez and its northwestern edge 1,500 yards distant from Castle Cornet Breakwater Lighthouse. Within the 5-fathoms curve it is nearly 1.5 miles long and 400 yards wide, and has a general depth of from 20 to 27 feet. There is a shoal patch of 18 feet near the center and only 1 foot more water at 200 yards and 900 yards, respectively, northeastward therefrom. From its southern limit St. Peter Port Church is in line with the Anfre Beacon, and from its northern limit the northern angle of Castle Cornet, the old harbor lighthouse, and Elizabeth College tower are in one. From the shoalest part, of 18 feet near the center, Doyles Column bears 234° and Castle Cornet Breakwater Lighthouse 331° nearly 1¼ miles. The Anfre Beacon and the White Stone Conical Beacon on the top of Fermain Point in line, lead across the northern end of the bank in 20 feet.

Clearing marks.—To pass eastward of all the rocks described near St. Martins Point and westward of the shoal part of the Great Bank, keep Saumarez Monument in line with or a little open eastward of the end of Castle Cornet Breakwater 358°. This mark also leads very close outside the Piette and the Anfre and Moulinet Beacons and between the Ferico and Oyster Rocks up to the Tremies.

St. Peter Port, the capital of Guernsey, stands on the eastern shore of the island, and has a population of about 18,000. From the sea it has rather an imposing appearance, but it is irregularly built. It is the seat of government of the northern division (or Bailiwick, as it is termed) of the Channel Islands, which includes Alderney, Serk, Herm, and Jethou. Its old tidal harbor is inclosed by the new harbor, formed between two breakwaters, with a depth in its entrance between them of 17 feet at low water springs.

Trade.—The principal articles of export are flowers, potatoes, grapes, tomatoes, melons, and other produce, also building stone and granite in a broken state for the repair of roads. The imports are

British manufactures, coal, wine, spirits, sugar, coffee, and other provisions, grain, etc.

Repairs, etc.—There are two patent slips in the northwestern part of the New Harbor capable of taking vessels up to 500 tons and with a draft of 15 feet at high water springs. There is a foundry here where castings can be made, and general repairs executed to both steam and sailing vessels; there is no dock accommodation.

On the wharves there are nine steam cranes with lifting power of from 1 to 4 tons, and eight hand cranes with lifting power of from 1 to 10 tons.

Communication.—St. Peter Port is in telegraphic communication with England by submarine cable from its northeastern point to Dartmouth, and with France through Jersey, also with Alderney by cable from l'Ancresse Bay.

This place is also in daily communication by steamer with Southampton, Weymouth, and Jersey all the year round; with London, Plymouth, Cherbourg, and St. Brieuc weekly; with Bristol and Morlaix periodically; with Alderney biweekly; and with Serk thrice a week regularly and almost daily in summer.

There is an electric railway between St. Peter Port and St. Sampson Harbor, a distance of 3.5 miles. A telephone service extends throughout the island.

A radio station is established at Fort George, where there is also a **semaphore** with which communication can be made.

Coal and supplies.—Coal in small quantities can be obtained at St. Peter Port, the stock in hand being usually about 1,700 tons. Water is supplied from the reservoir at Havelet. St. Peter Port market furnishes fresh meat, fish, vegetables, and fruit in abundance at a reasonable rate.

Storm signals are shown at Victoria Tower.

A signal station, for the exchange of signals both by day and night, has been established at Fort George.

Quarantine—Hospitals.—Vessels undergoing quarantine lie in St. Peter Port Road. There are two hospitals in the town and country, respectively, under the jurisdiction of the poor law board, and an infectious diseases hospital controlled by the board of health.

Depths.—Vessels can coal alongside the landing stage at the entrance of the port in 11 feet at low-water springs; here there is a depth of 40 feet at high-water springs, and nearly 33 feet at neaps, and there is sufficient water from half flood to half ebb for a vessel of 26 feet draft to lie alongside. At the second, third, and fourth landing stages, the depth is, respectively, 10, 8, and 4 feet at low-water springs, at which time there is 13 feet in the entrance between the piers and 10 or 11 feet near the middle of the pool, from whence the water shoals gradually and regularly toward the shore. A rocky spit extends northward from the rocks inside the southern breakwater, which dries at low-water springs, at the edge of which a red buoy is moored. There are several buoys in the pool for warping purposes.

Harbors.—The old tidal harbor of St. Peter Port, 4½ acres in area, is inclosed by piers of masonry 25 feet high, with an entrance 80 feet wide facing east. On the southern pierhead is a lighthouse. The depth at high-water springs between the pierheads is 22 feet and 15 feet at neaps; the average depth along the quays on the same tides being, respectively, 18 feet and 11 feet. Southeastward of the old harbor stands Castle Cornet, connected with the mainland by a massive granite causeway and wooden viaduct.

The new harbor works comprise two esplanades, one on each side of the old harbor, running parallel with the sea front of the town, together 640 yards in length within the breakwaters and 50 yards in width. From these esplanades extend two breakwaters, one on either side and equidistant from the old harbor, projecting eastward so as to inclose the natural sandy bay in front of the town; the whole space of both harbors thus inclosed being about 73 acres, of which all but about 23 acres dries at low-water springs.

The South or Castle Cornet Breakwater is carried across the rocky isthmus, by which at low water Castle Cornet is connected with the shore, and terminates at the northwestern bastión of the castle, being 630 yards in length. The southern face of this breakwater consists of an upright wall and parapet of rough masonry, 15 feet above the level of the highest tides, and along it is a level roadway and footpath 40 yards wide. From the northeastern angle of Castle Cornet outward a rough stone breakwater projects 200 yards farther eastward, its end marked by a circular granite lighthouse. These works, 930 yards in total length, effectually screen the entrance of the harbor from the most exposed quarter, the southward, and add greatly to the security of the anchorage in the road.

The North or St. Juliens Breakwater and landing pier begins northward of the Old Harbor, at the end of the esplanade, and extends in easterly direction about 465 yards to the head of the White Rock, from whence it takes a southerly direction a little outside the line of Castle Cornet for nearly 300 yards, leaving an entrance 120 yards wide between the pier end and the rocks off Castle Cornet and completely sheltering the pool within. This pier has four landing stages for steamers along its inner side, as already described. The bottom of the harbor is almost entirely of fine sand, except on the southern side, where is a rocky ledge, the edge of which is about 50 yards from the breakwater.

A lifeboat and life-saving apparatus are stationed at St. Peter Port.

St. Peter Port Road fronts the town northeastward of Castle Cornet. The holding ground is excellent and the road affords good shelter against all winds between southwest by south through west and north by east, but those from between northeast by north and southeast by east, if strong, cause much sea, and at such times a steamer does well to leave these roads and seek shelter in the Grande Greve, Serk. Winds from between south-southeast and southeast by east also send in much swell and sea, especially on the ebb tide, rendering this anchorage then unsafe. Under such circumstances smoother water may probably be found under the lee of the Great Bank, where a vessel will be much safer than in the road, as in the event of parting she may run through the Little Russel and anchor off Fort Doyle or in l'Ancresse Bay.

Depths. — The best anchorage is within the following limits: Southern limit, St. Peter Port (called the Town) Church in line with Castle Cornet Breakwater; northern limit, Sardrette Rock Beacon and Victoria Tower in line; western limit the outer angle of Castle Cornet on with the white beacon on Fermain Point; eastern limit the Anfre Beacon in line with the eastern extreme of St. Martin's Barracks. Within this space there is a depth of from 5 to 11 fathoms, fine sand; farther southward the bottom is coarse and the depth increases to 20 fathoms.

A vessel should, if possible, lie at single anchor, always keeping a second anchor ready; but if compelled to moor, the anchors should be laid in the direction of the stream.

Tides.—It is high water, full and change, at St. Peter Port at 6h. 37m.; equinoctial springs rise 33 feet, ordinary springs 26 feet, neaps 18¾ feet above the soundings; neaps range 11¼ feet. The general level of the sea is liable to be depressed or raised 2 or 3 feet, or even more, by strong easterly or westerly winds.

Tidal streams.—In St. Peter Port Road the southerly stream begins at 2¼ hours after high water there and runs 4¾ hours, attaining a velocity of three-quarters of a knot; and the north stream begins 7 hours after high water and runs 7¼ hours with a maximum rate of 1 knot. Both streams run nearly in the line of the coast; with strong winds from south to east they incline toward the shore.

Lights—New harbor—South pierhead.—On the outer end of Castle Cornet Breakwater, from a circular dark granite lighthouse 40 feet high, is exhibited at an elevation of 46 feet above high water a fixed white light visible 10 miles. It shows as a bright light seaward when bearing from north, through west to south, and as a faint light landward, in the other semicircle.

White Rock Pier.—From a white circular stone tower at the outer end of St. Juliens Breakwater, a fixed green-and-white light is exhibited at an elevation of 36 feet above high water visible 4 miles.

From an ordinary lamp-post 10 yards south of the lighthouse, a fixed white light is shown elevated 18 feet above high water, which should be seen from a distance of 2 miles.

Fog signal.—At the head of Castle Cornet Breakwater, a fog horn is sounded by compressed air, electrically controlled from White Rock Pier.

Old harbor.—On the southern pierhead of the old harbor is a white wooden lighthouse 24 feet high, from which, at an elevation of 34 feet above high water, is exhibited a fixed red light visible 7 miles; it may be seen from the Russel Channels, and also from the southward after rounding St. Martins Point. When bearing 265° it leads into the harbor.

A fixed green light, showing seaward, is exhibited from an ordinary lamp-post on the north pierhead of the Old Harbor at the height of 18 feet above high water, visible about 2 miles.

Belvedere.—From the high land of Belvedere, Fort George, 1,100 yards 220° from Castle Cornet Breakwater Lighthouse and elevated 200 feet above the level of high water, exhibited from an iron tower a fixed white light, with an obscured sector, visible 12 miles. This light in line with Castle Cornet Breakwater Light bearing 220° leads through the Little Russel Channel, passing ½ mile northwestward of Platte Boue, about 100 yards northwestward of Roustel and Grune au Rouge Buoys, but only 20 yards southeastward of the Trois Grunes and of Boue Agenor sunken rock.

The mail steamers have reported that this light is frequently seen in clear weather from the vicinity of the Casquets.

Beacons.—Northward of St. Peter Port the eastern shore of the island is fronted by rocks and ledges and is very foul; the outer and most important of these dangers are included in the description of the Little Russel Channel.

Within 300 yards of the elbow of St. Julien breakwater are three rocks marked by beacons. The Sardrette, marked by a pole surrounded by a barrel with the letter "S" under it, all painted black, dries 19 feet and borders the roadstead; the Goubeau Rock, marked by a black, truncated cone beacon of masonry, 12 feet high, surmounted by a pole 12 feet in length, with a white cross at the top, is 140 yards northward of the Sardrette; and the Roche a deaux Tetes, with a black pole beacon, having an iron bar across its top with a large knob at each end, lies about 200 yards westward of the Goubeau.

Quaine Rock, about 400 yards 1° of Goubeau Beacon, is marked by a pole, with the letter "Q" painted black. Demie Flie Beacon, 450 yards northeast of the Quaine, is an iron pole surmounted by a barrel.

Directions.—A vessel from the westward bound to St. Peter Port or to the anchorage off the eastern side of Guernsey, and intending to pass southward of the island, should, as before stated, make careful allowance for the flood stream, if it be running, as it sets in toward the land. Rounding Pleinmont Point give the lighthouse on the Hanois Rocks a berth of at least 1.5 miles to avoid the Hanois and Bise Banks, and to clear the Hanois Rocks keep Corbiere Point or La Moye Point well open of Pleinmont Point and of the Tas de Pois d'Aval Rock.

To clear Pleinmont Ledge and all dangers between it and La Moye Point, do not shut in Lihou Island with Pleinmont Point until Serk Church, which stands northward of the mill, is open of Jerbourg Point. When abreast of La Moye Point, open the northern point of Serk southward of Jerbourg Point, or keep Pleinmont Bluff open of Corbiere Point, to avoid the Balleine Rock, awash at low water, 231° 450 yards from Icart Point. After passing this point keep Sommeilleuse Guardhouse, a ruin standing on the edge of a high and remarkable cliff a short distance eastward of La Moye Point, open southward of Icart Low Point until Brehon Tower opens eastward of the Longue Pierre Beacon, or until the ruin of Herm mill touches the northern side of the high land of Jethou; either of these marks lead outside the Grunes de Jerbourg.

Rounding St. Martins Point, Saumarez Monument, in line with the end of Castle Cornet Breakwater, 358°, is the leading mark between the Anfre Rock and Great Bank, keeping St. Martins Barracks open southward of the Anfre Beacon until Salerie Battery opens of Castle Cornet Breakwater, or until the breakwater lighthouse bears 321°. When the town church opens northward of the breakwater anchor in the road, as convenient, or run into the harbor if the tide serves.

To pass eastward of the Great Bank keep Vale mill about midway between Mont Crevelt Tower and Vale Castle, and touching the eastern end of the breakwater of St. Sampson Harbor, 347°; and, when the town church is shut in behind Castle Cornet, haul in for the anchorage.

At night, when running for this anchorage from the northeastward, through the Great Russel, steer southwestward until the fixed red light on the south pierhead of St. Peter Port old harbor well open southward of Castle Cornet bears 307°, which line of bearing leads southward of the Tetes d'Aval and over the northern part of the Great Bank in from 21 to 25 feet at low water. On nearing the castle and making for the harbor, bring the red light open northward of the white light on Castle Cornet Breakwater, and with the red light bearing 265°, anchor in the road or run on into harbor. The red light touching the southern part of Castle Cornet leads between the Tetes d'Aval and the buoy marking them, and only 50 yards southward of the rocks, and across the Great Bank in 21 feet water.

The green light on White Rock Pier open to the northward of the white light on Castle Cornet Breakwater clears the shoals southeastward of Castle Cornet.

Steering for the Little Russel from the northward keep the Casquets light on a 19° bearing until Belvedere light and Castle Cornet Breakwater light are in line, bearing 220°, which is the leading mark through the channel. This passage, however, should never be attempted at night by a stranger, nor even by a person acquainted with the place, unless in a steamer of light draft or near high water.

From the westward and southward by night, after passing St. Martins Point, steer to the eastward until the old harbor red light is seen just clear of Terres Point, bearing 343°. Kept in sight on this line it leads 500 yards eastward of the Longue Pierre Beacon. When St. Martins Point bears 215° steer 15° to pass between the Anfre Rock and the Great Bank, and when Castle Cornet Breakwater white light bears 321° steer 355° until the red light bears 265°, after which proceed as before directed.

St. Sampson Harbor is on the eastern side of Guernsey, 1.5 miles northeastward of St. Peter Port, between Mont Crevelt and Vale Castle. The harbor is rectangular in form, its extreme length being about 1,900 feet northwest and southeast, with an average width of 500 feet, and containing a water area of 22 acres at high water springs. The site of the harbor was originally the eastern entrance to a strait which severed the northern portion of Guernsey from the main island. About the beginning of the last century the strait was embanked at each end and the intervening land reclaimed. There are two small patent slips in this harbor. The parish of St. Sampson contains a population of about 5,573.

Trade. — At St. Sampson Harbor the stone trade is the chief industry.

Depths.—At low-water springs the harbor is dry and the tide ebbs for a considerable distance outside the pierheads. The entrance between the pierheads is 120 feet wide, the depth at high water springs 22 feet, and at neaps 15 feet. At neaps there is a depth of 12 feet along the southern pier and 11 feet for a length of 150 feet along the south quay, from which spot it gradually shoals to its western end. There were dredging operations under way in 1913.

A rocky patch, with 10 feet water, lies near the center of the channel leading to St. Sampson Harbor. From this patch the Grunette

Beacon, representing the figure of a man, is just touching the southern side of Mont Crevelt Battery, and St. Peter Port Church is just open eastward of the Vivian Rock Beacon, painted with black and white rings.

Lights.—On the shore, close to the western corner of the inner harbor, from a gray stone tower, is exhibited a fixed green light, 45 feet high, visible 7 miles.

Also, from a red pillar-box structure, on the southeast end of the short arm between the outer and inner harbors, is exhibited a fixed red light, 36 feet high, visible 7 miles.

These lights, respectively, rear and front, when in line 295°, lead into the harbor between the Torode Rocks and the southwestern heads of the Platte Rock.

Directions.—The approach to this harbor is difficult, being athwart the tidal streams and having the Crabiere, Grunette, Grande Demie, and other rocks off the entrance. The most dangerous of these is the Crabiere, dry at low water, in the fairway of the entrance and distant about 200 yards from the head of Mont Crevelt Pier. It has, however, been reduced in height, having now 9 feet on it at half tide.

The best entrance to the harbor is between the Crabiere and the Grunette Beacon. This passage, however, is not above 100 yards wide, and the leading mark is the Grunette Beacon on with the southern tangent of the pier until close up to the beacon, when pass 50 yards northward of it and steer in between the pierheads. The bottom is blue clay covered with a layer of sand.

Bordeaux Harbor, ½ mile northward of St. Sampson, is quite insignificant and used only by fishermen. Here small craft lie aground; but, as the entrance only admits vessels of about 10 tons, a further description is needless.

Doyle Fort.—One mile northward of Bordeaux Harbor is Doyle Fort, standing on the northeastern point of Guernsey, off which lie the Brayes, Platte Fougere, and other rocks included in the description of the Little Russel Channel; between these rocks and the shore is the narrow channel named Doyle Pass. About 1,350 yards westward of Doyle Fort is l'Ancresse Bay, and westward of the bay the land trends in a 243° direction about 6 miles to Lihou Island.

Fog signal.—In the event of Platte Fougere fog signal being out of order from any cause during thick or foggy weather a siren at Fort Doyle will be sounded.

Telegraph cables.—The shore end of the telegraph cable connecting Guernsey with Dartmouth is landed near Doyle Fort. That connecting Guernsey with Alderney is landed in l'Ancresse Bay.

L'Ancresse Bay, on the northern side of Guernsey, westward of Fort Le Marchant, affords good shelter for small craft during southeasterly, southerly, and westerly winds. in depths of from 6 to 2 fathoms. Victoria Tower in line with No. 6 martello tower, near the middle of the bay, 193°, leads up to the anchorage. The bottom is muddy sand and excellent holding ground.

Grand Havre, about a mile westward of l'Ancresse Bay, has its entrance between Mont Guet on the north and Rousse Point on the south, on both of which points are martello towers; Vale Church is near the shore at the head of the Havre. It affords excellent anchorage for small vessels in from 14 to 9 feet water, the bottom of sand and grass, with good shelter against southerly and easterly winds; northwesterly winds, however, send in a heavy swell and sea between half flood and half ebb, though with good ground gear little danger is to be apprehended. For vessels capable of taking the ground there is a safe place on the southeastern side of Rousse Point. The Rousse de Mer, a dangerous rock which uncovers at a quarter ebb, lies in the fairway of the entrance, and on each side of it are many other rocks. From the Rousse de Mer, Saumarez Monument just shut in with the southwestern angle of Vale Church bears 147° and the watch house on the highest part of Lihou Island in line with the highest part of Grand Saut Roquier, 230°.

Directions.—The dangers off the entrance to Grand Havre are very numerous and extend fully 1.3 miles from the shore, so that it can be safely approached by only one channel. This channel lies between the Rousse de Mer and Main Rocks; the former dries 20 feet, the latter 5 feet at low water springs.

Victoria Tower in line with the rocky point just eastward of Rousse Point martello tower 171° (see view on chart), leads in until Saumarez Monument opens southwestward of Vale Church; then steer for the high rocky bluff near the middle of the bay and anchor when about midway between the martello towers on the entrance points in about 10 feet water. A vessel of only 6 feet draft may anchor with Noirmont Guardhouse in line with Rousse Point martello tower and Victoria Tower about midway between Rousse Point and the rocky bluff near the middle of the bay.

Roque Noire, Boue Corneille, L'Etac and Saut Roquier Rocks, lying from 1,400 to 1,700 yards offshore between Grand Havre and Grand Roque Point, extend fully a mile in a 63° and 243° direction. They are, respectively, 16, 6, 23, and 22 feet above high water, and thus serve to distinguish this part of the coast when the dangerous rocks around them are covered. Grand Roque Point has on it a rocky hummock, from which it takes its name, and on which stand a small fort and watch tower.

The Hoffets are dangerous rocks, most of which uncover only at low water; the outer head, then awash, bears 357° 1,500 yards from the Roque Noire; the Mouliere uncovers 10 feet nearly midway between it and the Roque Noire, and the Gripe de Rousse, 700 yards eastward of the Mouliere, has but 3 feet over it. The Rousse de Mer dries 20 feet, only 500 yards east by southward of the Gripe de Rousee, and is itself surrounded by rocky heads, some of which uncover.

Victoria Tower in line with Rousse Point martello tower 170° leads 1,100 yards eastward of the outer head of the Hoffets and 200 yards eastward of the Rousse de Mer; the Petite Braye open northward of Roque au Nord leads northward of the Hoffets; and Torteval spire in line with Fort Houmet 205° leads 400 yards westward of them and clear of all dangers up to the Grand Saut Roquier.

Some dangerous rocks, awash at low water, and one which uncovers 11 feet, extend 276° nearly 400 yards from the Grand Saut Roquier; others outside and northward of them are always covered; the outer rock, called the Moulrette, has 4½ fathoms water and bears 316° 800 yards from the Grand Saut Roquier.

There is a good channel inside all these rocks, and anchorage secure from easterly winds will be found inside the Grand Saut Roquier. The leading mark through the channel is the lower house on Lihou Island, just touching the outer corner of the Mouilliere Rock 233°; there is also a channel between the inner heads of the Hoffets and Boue Corneille, but neither channel should be attempted without a pilot.

The Plaquiere Rock, with 8 feet water, lies ½ mile westward of Grand Saut Roquier and 1.3 miles 112° from the outer and highest rock of the Grunes de l'Ouest, with Victoria Tower just open southwestward of the Grand Roque Tower 136°. It may be cleared by keeping Victoria Tower well open on either side of Grand Roque Tower.

Cobo and Vazon Bays, halfway between Grand Havre and Rocquaine Bay, have good anchorage in easterly winds, but with westerly winds there is generally a rolling swell along this coast on the flood tide, and this, together with the numerous outlying rocks, renders these bays dangerous of approach.

The principal dangers off these bays inside the Grunes de l'Ouest, described previously with the other outer dangers, are the Susanne, which dries 7 feet 102° 400 yards from the Grunes de l'Ouest; the Grunettes, which dry 3 feet 147° ½ mile from the Grunes de l'Ouest; Boue de Jardin and Boue St. Saviour, each with 13 feet water, between the Grunettes and the Mouilliere; Boue Auber, which dries 8 feet 91° 700 yards from the Sambule; the Flabet, which dries 1 foot, about midway between the Grande Etacre and Sambule; the Boue Sarre, with 8 feet water, halfway between the Flabet and the Grande Etacre.

There are also the Colombelle, which dries 2 feet 296° 850 yards from the Conchee Rock at the entrance of Perelle Bay; the Messellettes, nearly awash at low water, 1° ½ mile from the Conchee; Boue Vazon, which dries 7 feet and lies with St. George's white tower in line with the southwestern angle of Fort Houmet, and the watch house on Lihou Island just open inside the Conchee; the Fourquies, awash at low water, 201° 550 yards from Boue Vazon; the Petit Etat, which dries 20 feet 318° 350 yards from Fort Houmet; and the Gros Etat, 8 feet above high water, midway between them and at the outer edge of the rocks off Fort Houmet.

The Mouilliere, 350° 1,250 yards from Fort Houmet, is 8 feet above high water springs; it is surrounded by rocks, of which many uncover; they extend rather more than 200 yards westward, but not more than 150 yards northward of the Mouilliere. The lower house on Lihou Island in line with the Conchee Rock 231° leads northward of these rocks.

Directions.—To approach Vazon Bay from the northeastward, run in with Torteval spire well open westward of Fort Houmet, and as the land is neared and before passing Grand Saut Roquier be careful to bring Torteval spire in line with Richmont Fort flagstaff 194°, which mark leads midway between the Grunettes and Mouilliere and nearly 200 yards eastward of Boue Vazon, within which anchor as convenient in a depth of from 6 to 8 fathoms, sand.

To run out of the bay between the Grunettes and Boue Auber bring St. George's tower on with the northeastern side of Fort Houmet. The lower house on Lihou Island in line with the Conchee leads nearly 200 yards northward of Boue Vazon; and Noirmont House and Grand Roque tower in line, or St. Matthew's Church on with the southwestern end of Fort Houmet 99°, leads out between the Sambule and Colombelle; *see* view on chart.

Perelle Bay, westward of the Conchee Rock, affords good shelter to fishing boats at low water, but is only safe for such as can take the beach in the event of a westerly gale setting in. In running around from this to Rocquaine Bay, Hanois Lighthouse open eastward of the Trois Peres leads inside and eastward of the rocks extending in that direction from the Grande Etacre.

Herm and Jethou Islands, off the eastern end of Guernsey, together with the Amfroque Rocks on the north and the Ferriere and other rocks on the south, extend rather more than 5 miles in a 30° and 210° direction and divide the Great and Little Russel Channels from each other. Herm is 1.3 miles long, ½ mile wide, 206 feet above the level of high water, and its center bears east 3 miles from the entrance to St. Peter Port. The little island of Jethou is ½ mile southwestward of Herm and 16 feet higher. Their united population in 1901 was 28.

Beacons.—The rocky islets Crevichon and Grande Fauconniere are connected with Jethou at low water, the former on its northern, the latter on its southern side; the summit of each is marked by a white stone conical beacon.

The Ferrieres—Beacons.—These most conspicuous rocks, southwestward of Jethou, never cover with the tide. The northern head of the Barbees, their outer or northwestern rock, bears 231° 1,300 yards from the south end of Jethou, and is marked by a staff and barrel beacon. The Demie Ferriere, or Demie de Muse, as it is locally known, uncovers 12½ feet 600 yards 167° from the Barbees Beacon and 200 yards eastward from the Muse Rock, which itself dries 2¼ feet; it also is marked by a beacon 10 feet above high water, with the distinguishing letter M in black. The northeastern angle of Castle Cornet on with the Victoria Tower 292° leads 200 yards southward of these rocks, between which and the Tetes d'Aval, 191° 1,100 yards from the Demie Ferriere and 203° 1.3 miles from Jethou, there are good ship channels, which, however, should not be attempted without a pilot.

The Tetes d'Aval and other principal rocks southward, westward, and eastward of Jethou are included in the description of the two Russel Channels, according as they affect the navigation of the one or the other.

Grande Amfroque—Beacons.—The Amfroque and other outlying rocks extend northeastward 3.3 miles from Herm. The Grande Amfroque, 2.3 miles 43° from the nearest point of Herm, is the outer rock showing above high water; it has two peaks, is about 140 yards in diameter, and 54 feet above high water. On this rock stand two conical stone beacons 35 yards apart, bearing 151° and 331° from each other. The southern beacon is 35 feet above the rock, surmounted by a cross, and painted black and white in horizontal bands; the northern beacon is 20 feet high, surmounted by a round cage, and painted white. The two beacons in line indicate the position of the Platte Boue Rock, presently described.

The Grande Amfroque is surrounded by dangerous rocks, of which the easternmost is the Bonne Grune, with 14 feet water, which bears from the Grande Amfroque 77° 1.1 miles, and is at the western side of the entrance to the Great Russel Channel. The Selle d'Amfroque, bearing 37° ½ mile from the Grande Amfroque Beacons, has 17 feet water over it, and within it to the westward lie the Demies du Nord and the Petite Amfroque, which uncover 10 and 27 feet, respectively.

Cul de l'Autel and Longue Pierre Rocks.—At 1,200 yards west from the Grande Amfroque lies the Cul de l'Autel, a table rock about 32 feet above high water, and between the Cul de l'Autel and the northern point of Herm, at nearly equal distances, are the Longue

Pierre and Traiffe Rocks, respectively, 47 and 35 feet above the high-water level, and also Godin Islet, 37 feet, which, as well as the Longue Pierre, is covered with a light soil, on which grow a variety of wild flowers; the Traiffe is near the southeastern side of the Longue Pierre, and resembles a ship under sail. Besides these are many others of minor importance which do not cover, as well as numerous tidal rocks and ledges and many sunken rocks.

Platte Boue Rock, nearly 1,600 yards 331° from the Grande Amfroque Beacons, is the northernmost danger off Herm, at the eastern side of the entrance to the Little Russel, and is only 1 foot below the surface at low-water springs. It is about 20 feet in diameter and steep-to all around, but 41° 165 yards from it is a rock with 15 feet water, and 209° 600 yards from it is the Boufresse, a large flat rock which dries 8 feet.

The marks for the Platte Boue are Catel spire on with the Canteen House at the gate of Vale Castle, showing at its southeastern angle 237°, and the Grande Amfroque Beacons in line 151°.

Clearing marks.—Doyles Column, Guernsey, in line with Brehon Tower 215° leads ½ mile, and Tautenay Beacon turret, on with Doyles Column, leads 270 yards northwestward of Platt Boue Rock. Tautenay Beacon turret in line with Brehon Tower is a very close mark, clearing its northern side by only 100 yards, and Catel spire, in line with the northwestern angle of Vale Castle, also clears it on the same side by less than 100 yards.

The channels through and among these rocks and islets are extremely intricate, and are rendered dangerous by the rapidity and variety of the tidal streams; two of them, however, are sometimes used by ships in charge of Guernsey pilots, viz, Hayes Channel, between Godin Islet and the Longue Pierre Rocks, and Passe Percee, between Herm and Jethou.

Hayes Channel.—This channel, though very narrow and tortuous, has nothing less than 35 feet at low water, at which time there is a rock awash at its eastern entrance, exactly in line between the Longue Pierre and Godin. Entering the channel from the eastward, to sail southward of this rock, keep Vale Mill in sight southward of the Pierre de la Moue until past that line. Pass 200 yards northward of the Pierre de la Moue and then haul gradually westward until the highland of Serk at Banquette Point comes over Godin, and then haul to the southwestward with Longue Pierre and Grande Amfroque southern beacon in line, until the peak of Godin just open northward of the northern extreme of Galeu bears 113°, which mark astern leads into the Little Russel between the Tautenay Ledge and the rocky banks extending from the northern point of Herm.

Anchorage out of the strength of the tide, in a depth of 8 fathoms, and with good holding ground may be found south of Tautenay

Ledge by bringing the Peak of Godin between the two sharp peaked rocks of Galeu 108°, and Brehon Tower in line with the Rousse Rock Beacon 230°. There is good anchorage also southwestward of this, inside the Cavale Rock, in 6 fathoms, sand, with the Pierre aux Rats, a small stone obelisk on the northern part of Herm in line with the Mouisonniere Rock 119°, and Brehon Tower between the Rousse and Blanche Rocks.

Passe Percee.--The dangers to be avoided in running for the Passe Percee from the eastward are the Fourquies, which uncover near low water 1,200 yards from the land, northeastward of the Goubiniere Rock and right in the fairway, and farther in, the Meulettes Rocks, on the starboard, and the Tinker Rocks on the port hand. Vale Castle touching the southwestern end of Herm 307° leads eastward of the Fourquies, and Vale Mill, the northeasternmost on Guernsey, touching the northeastern side of Jethou 312° leads westward.

Depths.—The least depth in this narrow, winding channel is 13 feet, in line between the Vermerette Beacon and Epec Pole Beacon surmounted by the letter E, marking the reef extending toward it from Jethou. At high water, springs, the depth here is 6½ fathoms, and at neaps a fathom less.

Meulettes and Tinker Rocks.—Meulettes Rocks dry 3 feet at low water about 100 yards from the southern point of Herm, and the Tinker Rocks about 200 yards eastward of Jethou. The Vermerette Rock Beacon, surmounted by the letter V painted black, in line with the Percee Rock, which is 8 feet above high water, leads westward of the Meulettes, and the western side of the little green plat on the Hermetier, 6° eastward of the highest part of the Mouette, leads eastward of the Tinker.

Directions.—After clearing the Fourquies, bring Vale Mill open westward of both the Percee and Corbette Rocks, the latter marked by a pole surmounted by a flat circular disk, 310°; this mark clears by 60 yards the outer point of the Percee Rock, which covers at half tide, and leads through in mid-channel; the narrowest part is between the Epec Beacon and the Vermerette Beacon, before mentioned. With a proper rise of tide, the same mark leads right through to the Little Russel, giving the Corbette Beacon a berth of 100 yards in passing southward of it, but at this part the depth of water is 5 feet less than in the main channel. To carry the deepest water: When Saumarez Monument opens northward of Brehon Tower, about the apparent breadth of the tower, take it as the leading mark to clear the Etacre Rock, which dries 3 feet; when abreast of the Etacre, the Victoria Tower is in line with the Petit Creux Rock Beacon, a staff with a black cap or truck, with which mark haul to the westward and proceed up to the Petit Creux Rock, round it on its southern side at

100 yards, to get into the Little Russel, passing between it and the Alligande Beacon, 450 yards 189° from it and distinguished by the letter A, painted black, as top mark.

Anchorage.—Between Herm and Jethou, off the Mouette Rock, is the Rosiere anchorage, where small vessels may find good shelter from all winds, except those from southwest by south round by south to southeast by east; the best entrance is from the Great Russel Channel.

Tidal stream.—The stream runs through the Passe Percee, nine hours to the southward and only three hours to the northward; the southern stream commencing at low water by the shore, and setting directly into the Great Russel during the whole of the flood and until half ebb, when the northern stream begins and runs with but little strength until low water. A vessel, therefore, caught at this anchorage by a southerly wind may always, at half ebb, run northward through the Passe Percee into the Little Russel Channel, and from thence to the anchorage inside the Cavale Rock or into St. Peter Port Road.

Little Russel Channel, between Herm and Guernsey, is much contracted by the numerous rocks projecting from each island as far out as the Roustel on the Guernsey side, which may, however, be almost considered a midchannel rock, and the Rousse Rock on the side of Herm, which two rocks are little more than 600 yards apart. The wind from northwest by north round by north and east to southeast by east is a leading wind through this channel from the northward, and without a leading wind no square-rigged vessel of deep draft should attempt its navigation.

The entrance to the Little Russel from the northward is between the Braye Rocks on the western side and the Amfroque Rocks on the eastern. The approach to both these groups is exceedingly dangerous on account of the tidal streams which set across the entrance to the Russel Channels, and also from the numerous rocks, hidden and visible, by which they are encompassed, of which the most dangerous are the Platte Boue and Boufresse belonging to the Amfroque group and the Platte Fougere in the vicinity of the Braye.

Depths.—Though the depth in the Little Russel varies greatly, viz, from 25 or 26 fathoms in either entrance to from 5 to 8 fathoms in the narrows, any vessel carefully navigated may pass through at low water without ever being in less water than 7 fathoms.

The following are the principal rocks on the western side of the Little Russel Channel:

Braye Rocks—Beacon.—The Grande and Petite Braye Rocks are about 1 mile from the shore off the northeastern point of Guernsey; they are within 400 yards of each other, and both are surrounded by outlying dangerous rocks. The Grande Braye (upper part whitewashed) is 7 feet above high water springs; the Petite Braye is 5 feet lower.

Platte Fougere.—The Platte Fougere lies about 800 yards southeastward of the Petite Braye, and uncovers at about half tide; the ground is clean 200 yards eastward of the reef.

Light.—From a gray octagonal tower with a broad black band is exhibited a flashing white light, 50 feet above high water, and visible 12 miles.

Fog signal.—From the lighthouse, during thick or foggy weather, a siren is worked by air.

In the event of Platte Fougere fog signal being out of order from any cause, a siren at Fort Doyle, on the northeastern extreme of Guernsey, will be sounded.

Telephone.—A free telephone office for the use of pilots and ships' officers has been opened on Platte Fougere. The instrument furnishes communication with Guernsey.

Canupe and Corbette Rocks—Beacons.—Nearly midway between the Platte Fougere and Corbette (d'Amont) Rock (which latter lies 650 yards 102° from Houmet Paradis, dries 16 feet, and is marked by a staff and iron cage ball, painted red) lie the Canupe Rocks, whose southeastern head, named the Petite Canupe, appears only about the last quarter ebb, uncovering 8 feet, and is marked by a wooden beacon, painted black, surmounted by the letter C in white.

Clearing mark.—To clear the Braye Rocks and all dangers eastward and southward of them, keep the southwestern extreme of Little Serk open eastward of the low northeastern sandy point of Herm 150°; this mark leads into the fairway of the Little Russel.

Platte Roque—Beacon.—The Platte Roque dries 10½ feet 192° 1,100 yards from the Corbette. It is marked by a beacon having the appearance of the lower mast and top of a ship, painted with black and white bands. About 200 yards 96° from the beacon is a rock awash at low water, and from this rock toward the Corbette, on a line curving outward more than 200 yards toward the channel, are the Gant Rock, awash at low water, and other dangerous rocks, which should be carefully avoided when passing.

Boue Agenor—Buoy.—This rock with only 4 feet water, very small and steep-to, is the southwestern and inner danger on the western side of the Little Russel, of which it is necessary to caution strangers. On its eastern side, in 9 fathoms, close to the rock, is moored a conical buoy, painted with red and white vertical stripes and the word "Agenor" in black. From this rock the western end of the Coal Hole, under Vale Castle, on with St. Sampson Breakwater end, bears 358°, and Hogue des Quertiers in line with the northern edge of the trees of Ivy Castle, a ruin, 286°.

A rock, covered with 9 feet water, lies nearly 200 yards 223° from the Agenor; another with 12 feet at nearly the same distance 201°; and a third rock, the Trois Grunes, with 13 feet, at 400 yards 37° from it.

The following are the principal rocks on the eastern side of the Little Russel:

The Platte Boue and Boufresse have been previously described.

Tautenay Rock—Beacon turret.—The Tautenay, all but covered at high water and marked at its northeastern end by a beacon turret 22 feet high, painted in black and white vertical stripes and surmounted by a staff; the Cavale, which dries 1 foot at low water; the Rousse Rock; and the Boues Gennete, lying nearly midway between the Rousse Rock and Brehon Tower, but 270 yards outside the line joining them and in the channel.

Rousse Rock—Beacon.—The Rousse Rock is 12 feet above high water springs, and is marked by an iron beacon, consisting of a cross with an anchor fluke at each point. It bears 291° 1,200 yards from the northwestern point of Herm. A dangerous string of rocks, awash at low water, projects in a 265° direction 60 yards from the Rousse.

Clearing marks.—To pass northwestward of all these rocks, keep Catel Spire 3° open northward of Vale Castle 237°, which mark leads into the fairway of the Little Russel; and, when the Grande Amfroque Beacons are in line, a vessel is abreast of the Platte Boue.

Doyles Column in line with Brehon Tower is a good clearing mark for the rocks on the eastern side of the Little Russel as far as the Cavale, to clear which the column must be opened one side or the other of Brehon Tower. A vessel is abreast of the Cavale when the Pierre aux Rats Obelisk is in line with the Mouisonniere Rock 116°. The latter is a remarkable pointed rock on the sandy northern beach of Herm, always uncovered, being about 7 feet above the high-water level. Doyles Column in line with Brehon Tower also clears the rocks extending from the Rousse, but leads inside the Boues Gennete.

Roustel Rock—Buoy.—The Roustel is the most dangerous rock in the Little Russel, as it lies exactly in mid-channel and does not uncover until 4 hours ebb. A black buoy is moored about 20 yards from its southwestern end. From its shoalest head the Rousse Beacon bears 119°, 675 yards; a sunken rock connected with the Roustel, 51° 100 yards; the Corbette Beacon, 316° 1,100 yards; the Platte Beacon, 257° ½ mile; and the Grune au Rouge, 220° nearly 1 mile.

Grune au Rouge—Buoy.—This is another rock lying in mid-channel abreast of the Brehon Tower, from which it bears 302° 700 yards. It is of small extent, has only 3 feet over it at low-water springs, and is marked by a red buoy moored 6° 50 yards from it.

Directions.—The best leading mark to the entrance and through the Little Russel Channel when approaching it from the northward is St. Martins Point just open westward of Brehon Tower 208°; no other mark is so conspicuous or shows so quickly any alteration of the vessel's position. It leads a mile westward of the Platte Boue and rather more than that distance eastward from the Platte Fougere, and from thence along the eastern side of the channel, between the Roustel and Rousse Rocks, and directly toward the Boues Gennete; but when the high land at the northeastern end of Serk begins to shut in with the northernmost bluff land of Herm, or when Saumarez monument appears within its breadth of Mont Crevelt Tower 257°, a vessel is between and abreast of the Roustel and Rousse Rocks. Near this position Belvedere House, a large building on the bluff eastward of Fort George, will be in line with a white patch just within the southeast angles of Castle Cornet, which mark leads more than 100 yards eastward of the Grune au Rouge, about 200 yards eastward of the Agenor and all other dangers, and up to the anchorage in the road. This mark leads right up through the Little Russel and is the only leading line that answers this purpose; but as it leads rather near the Grune au Rouge, on approaching and in passing that rock keep the northern angle of Belvedere House on with the southern angle of the white patch, bearing in mind that the red buoy being on the northeastern side of the Grune au Rouge tails some distance from it when the northeastern stream is running.

To pass southeastward of the Roustel and Grune au Rouge, bring Belvedere House in line with the white patch just within the southeast angle of Castle Cornet; to pass northwestward of these dangers keep Belvedere Lighthouse in line with Castle Cornet Breakwater Lighthouse 220°. When Brehon Tower is in line with Herm Mill (in a ruinous condition and without sweeps), on the southern side of the center of the island, open the leading marks a little either way to clear the Trois Grunes and the Agenor, and run on until the town church opens southward of the old harbor lighthouse, then haul in for the anchorage.

If compelled to beat through the Little Russel, it may be useful to note that St. Martins Point open eastward of the Brehonnet Rock, which dries 16 feet 200 yards westward of Brehon Tower, clears the Roustel, and St. Martins Point open one side or the other of the Brehon Rock clears the Boues Gennete also on either side.

By night.—Approach on a safe bearing of the Platte Fougere flashing white light (between south and west-southwest), and when about 3 miles from the light (Serk 64° Hanois), steer to get on the leading mark and follow directions as given. Castle Cornet Breakwater Light and Belvedere Light in line 220° is the leading mark through the Little Russel Channel; it leads well clear of the outer shoals, but only about 130 yards westward of the Roustel and Grune on Rouge Shoals, and very close eastward of the Trois Grunes and of the Agenor Rock; all of which, however, are easily avoided by opening the lights a little as may be necessary when in their vicinity.

Doyle Pass.—To enter the Little Russel by this channel, keep the windmill on Serk just open northward of the northernmost high land of Herm, and in line with the Mouisonniere, bearing southeast, which mark leads through the pass between the Roque au Nord and the Grande Braye, inside the Grune Pierre, which uncovers 4 feet, and between the Grune la Fosse and the Vraic, both awash at low water into the fairway of the Little Russel. In taking this channel near low water the greatest care must be used to preserve the leading mark; the narrowest part is between the Grune Pierre and the rocks off Homptol, its width here being only 217 yards. With the leading mark on, the Pierre aux Rats Obelisk appears a little to the left of the Mouisonniere, and so long as the leading line is maintained the least depth in this channel at low water, ordinary springs, should be 27 feet.

Great Russel Channel is bounded on its northwestern side by the islands of Herm and Jethou and by the Amfroques and other rocks northeastward, eastward, and southward of them, and on the southeastern side by the islands of Serk and Brecqhou and the rocks in their vicinity. This channel, which is the eastern passage to Guernsey, is about 2 miles wide, with deep water, and easy of access even to strangers.

The following are its principal dangers on the northwestern side, commencing with the northward:

Bonne Grune Rock, with only 14 feet water, is the outer danger at the northern entrance of the Great Russel. It bears 54° 3.3 miles from the northern end of Herm and 75° 1.1 miles from the Grande Amfroque Beacons; it is cleared 300 yards to the eastward by opening the western extreme of Little Serk of the eastern bluff of Brecqhou.

Noir Pute Rock, 1.3 miles 92° from Herm mill, and 203° 3 miles from the Bonne Grune, never covers, though at equinoctial springs it is sometimes nearly awash; all the rocks of the Amfroque Group lie northwestward of a line drawn from the Noir Pute to the Bonne Grune. A string of rocks, awash at low water, extends from it northeastward nearly 300 yards; from the Noir Pute Doyles Column appears 3° open southward of the Grande Fauconniere.

Grands Bouillons Rocks, having only 9 feet water, lie between the Noir Pute and the Fourquies. From them the Caquorobert, a large rock in the form of a haystack, projecting from the eastern side of Herm, in line with the northeastern low sandy point of that island, bears 340° and the Noir Pute 54° 1,700 yards.

Fourquies Rocks dry 7 feet, 226° 1.4 miles from the Noir Pute, and 99° 1,350 yards from the summit of the Grande Fauconniere Rock. From their center, St. Martins Point, in line with the Goubiniere Rock, bears 240°, and Vale Castle is in line with the sandy beach on the northeastern side of Crevichon Islet.

Goubiniere Rock, about 14 feet above high-water springs, lies 158° 800 yards from the Grande Fauconniere and 240° 1,200 yards from the Fourquies. At 300 yards 234° from the Goubiniere the Anon Rocks uncover 8 feet at low-water springs.

Banc des Anons, 600 yards southward of the Anon Rocks, has 18 feet water over its shoalest head. From this spot the Goubiniere bears 23° 850 yards, and Mont Crevelt Tower on with the western side of the Grosse Ferriere 319°.

Tetes d'Aval Rocks—Buoy.—These dangerous rocks bear 203° 1.5 miles from the highest point of Jethou Island and are awash at low-water springs. They are marked by a buoy with a flat round top, which tapers toward its underwater end, painted with black and white horizontal stripes, moored about 120 yards south-southwestward of their middle head. From this head Herm Mill is in line with the Petite Fauconniere, a remarkable red-headed rock on the beach between the Grande Fauconniere and Jethou. Vale Mill is its apparent breadth open westward of Vale Castle, and the lighthouse on the south pierhead of St. Peter Port old harbor just shut in with the southwest angle of Castle Cornet bears 298°.

Sardriere Rock, with 8 feet water, lies 450 yards 108° from the middle head of the Tetes d'Aval, with St. Martin's spire in line with the northern side of Fermain Beacon 276°, and the Selle Roque, off the southeastern side of Herm, twice its apparent breadth open westward of the Goubiniere.

The dangers of the eastern side of the channel are all near the shores of either Serk or Brecqhou, those only which require special notice being the Givaude Rock and the Grune.

Givaude Rock, about 44 feet above high water, forms the eastern boundary of the Great Russel Channel. It is 250 yards off the western end of Brecqhou, and from its northwestern point a reef extends nearly 200 yards. The Neste, a pointed rock which dries 20 feet, lies 6° 250 yards from the Givaude on the outer edge of a reef extending from Brecqhou.

The Grune is about 1.1 miles westward of Brecqhou; it has nothing less than 8 fathoms at low water, but the unevenness of the bottom and the strength of the tidal streams cause heavy tide ripples and a dangerous sea in bad weather. From its shoalest spot the Grande Amfroque Beacons in line with the Noir Pute bear 6°, and Victoria Tower is half the breadth of Castle Cornet open northward of the castle.

Directions.—The course from the middle of Alderney Race to the northern entrance of the Great Russel Channel is about 220° and the distance 17 miles. In approaching this channel from the northeastward, however, great care must be taken to avoid the Banc de la Schole lying nearly in the direct line between Alderney Race and the entrance.

Having entered the channel with the western extreme of Little Serk open eastward of the eastern bluff of Brecqhou as the leading mark, in order to clear the Bonne Grune, run on toward Brecqhou until St. Martins Point is 3° open southward of the Goubiniere Rock 243°; this leads southward of the Noir Pute (and also of the Grands Bouillons and the Fourquies). Thence steer about 231°, allowing for tide, keeping the Grande Amfroque its own apparent breadth open southeastward of the Selle Roque 22° until the lighthouse on the south pierhead of St. Peter Port old harbor opens southward of Castle Cornet, or until St. Martin's spire, seen over the trees, is in line with the martello tower in Fermain Bay; either of these marks leads southward of the Sardriere and Tetes d'Aval, after having rounded which, steer for the Great Road.

There is a good channel between the Tetes d'Aval and the Ferriere Rocks; the mid-channel leading mark is Victoria Tower, halfway between Castle Cornet flagstaff and the northern angle of the castle wall, bearing 295°. This channel, however, should not be attempted by a sailing vessel unless in case of emergency, the difficulty of the tides rendering its navigation hazardous.

When turning through the Great Russel the island of Serk may be approached to about ½ mile without fear, as there are no rocks at a greater distance than 400 or 600 yards from the shore between the Bec du Nez and Brecqhou Island; but, when standing toward the western point of Brecqhou, and southward of it, take care to keep the Grande Amfroque its own apparent length open westward of the Givaude Rock 357° to clear the Dents and Hautes Boues.

Standing northward toward Herm and Jethou, do not shut in St. Martins Point with the Goubiniere when eastward of the latter, but keep it 3° open; this clears the Fourquies, Grands Bouillons, etc.; then proceed as before directed.

The northeastern stream of tide slacks half an hour sooner on the southeastern side of the Great Russel—that is to say, under Serk—than on its northwestern side.

Serk.—This island is 3.3 miles 130° from Herm, and divides the Great Russel from the Deroute Channel. It is 1.3 miles wide and 2.5 miles long, including Little Serk, with which it is connected by the Coupee, an isthmus or narrow causeway. Serk is high and precipitous throughout, its most elevated part, at the base of the windmill near the center of the island, is 349 feet above the level of high water. The small island of Brecqhou, on its western side, is separated from it by the Gouliot Pass, a narrow channel only 70 yards wide, through which the tides run with great velocity.

There is no town in Serk, but a small hamlet or group of cottages on the northeastern side of the island is called La Ville. The island constitutes one Royal Fief or Manor, held direct from the Crown. There are 40 original copyhold farms, averaging 15 acres each, the titles to which descend in succession to the eldest sons, or, if no sons, to the eldest daughters of their occupants. The post office is in telephonic communication with Guernsey.

The island is fertile, highly cultivated, and, besides supplying all the wants of its inhabitants, exports largely in cereals and vegetables to Guernsey. Its rocky coast abounds with fish, and especially with crabs and lobsters. Its population is about 500. There is a church, where the Anglican service is conducted in French, and two endowed schools, also a Wesleyan Chapel and three hotels.

A close approach to Serk on all but the northwestern side is difficult, not only from the numerous rocks which encompass it, but also from the rapidity and irregularities of the tidal streams in its immediate vicinity. These difficulties, however, may be easily overcome if attention is paid to the leading marks and run of the stream, and the island affords good shelter against almost all winds, as may be seen by following the descriptions given of the different bays.

Creux Harbor.—There are several small inlets in the rocky coasts of Serk where fishermen haul up and secure their boats in stormy weather; the most noted and frequented is Creux Harbor, so called from a subterraneous passage in its neighborhood. It is on the eastern side of the island and is the general rendezvous for landing and shipping goods, as well as the principal resort of the fishing and other island boats. It is protected by a small jetty and affords perfect security to small craft; its entrance is, however, only 60 feet wide, and it dries at low water springs. The best anchorage off it is with Pin Rock in line with the Grande Moie and Point Terrible on with High Cliff, but small steamers may anchor temporarily, with offshore winds, about 150 yards closer in on the edge of the 5-fathom line, where the tide is not nearly so strong. From the latter position the southeastern part of Serk (near Breniere Islet) will be just open of Point Terrible.

Water.—On the southeastern side of Serk there is a tolerable run of water in Ixcart Bay, on the northern side of Baleine Bay, westward of Chateau Point; the stream during the winter season is very copious, and water may be procured with offshore winds without difficulty. It is the only accessible watering place around the island, with the exception of an inconsiderable drain in Port du Moulin, on its northwestern side, and another of similar character at Creux Harbor.

Islets and rocks around Serk.—The following islets and rocks, always above water, lie off the coasts of Serk:

The Noire Pierre, 400 yards from the shore off Banquette Point, on the northeastern coast, is a small square rock 11 feet above high water and steep-to all around.

The Petite Moie, 57 feet above high water, is a rocky mass, steep-to except at its northern point, off which, at the distance of 20 yards, there is a sunken rock.

The Grande Moie, off Robert Point, is a larger rocky mass 91 feet above high water and dangerous to approach, especially on its eastern side.

Point Robert—Light and fog signal.—On the eastern side of the island, at a distance of about 100 yards within the extremity of Point Robert, is exhibited at an elevation of 213 feet from a white octagonal tower 55 feet high a flashing red light visible 21 miles.

Fog signal.—From the same tower a fog reed horn is sounded.

The Burons are a cluster of craggy rocks 66 feet above high water in the form of a crescent, rising almost perpendicularly from the sea, steep-to on their southeastern side but dangerous to approach from any other quarter. They lie about 300 yards distant in front of Creux Harbor, and between them and Serk is the Goulet Pass, which dries halfway across at low water springs, the deepest water, 4 feet, being toward the outer rocks of Creux. Through this pass the tides run with great strength both ways, but especially about half flood, setting right for and over the Founiais and Grune de Nord Rocks on the northern side and over the Pierre Carree on the southern side; this pass therefore should not be attempted in a sailing vessel except in a case of great emergency.

The Conchee, about ½ mile southward of the Burons and 300 yards southeastward of Point Terrible, is a square rock, 11 feet above high water, whitened at the top, and having sunken rocks close-to on all sides.

The Baleine Rock, in Baleine Bay, is 20 feet above high water, and has a rocky reef extending 25 yards from its northeastern side; it is 350 yards from the shore.

Pierre du Cours is a small rock awash at high water and very steep-to on its southeastern side. As its name implies, it is a useful guide to vessels passing inside the Etac de Serk.

Etac de Serk is a rocky islet about 200 feet high off the southern end of Little Serk. In form it resembles a haystack, and is very conspicuous both from its appearance and position. It is steep-to on its eastern side, but a reef extends about 100 yards southwestward from it, and from its northern end a ledge of rocks, which dries 10 feet, extends 350 yards in the direction of the Pierre du Cours.

On the southwestern side of Little Serk are numerous rocks, the most conspicuous of which are the Moie du Port Goury, a square-topped rock, 64 feet above high water; the Moie de la Bretagne, a peaked rock, 59 feet high; and the Moie de la Fontaine, 59 feet high and close to the shore.

The Givaude Rock has been previously described.

The Moie Batard, a square rock of a whitish color, about 20 feet above high water, lies off the northwestern coast of Brecqhou.

Blanchard Rock, 330 yards eastward of Serk, has 7 feet over it at low water ordinary springs, but only 3 feet at the lowest tides. From it the Conchee Rock in line with the Convache, a remarkable cavity northward of the Coupee, bears 264°, and the high-water point of Bec du Nez, touching the southern overhanging part of the Gorge, a rock at the southwestern end of the Petite Moie 302°.

Chateau Point, in line with the Conchee 276°, leads southward of the Blanchard; the Corbiere Rock, off the southwestern point of Jersey, touching the land about Cape Grosnez 175°, leads a mile eastward, and the northern bluff land on Herm, in sight northeastward of Bec du Nez 296°, leads northward.

Many rocks lie within the Blanchard and eastward of the Burons, and between them are navigable channels with depths of from 10 to 26 fathoms; they are, however, seldom used by any but the island boats on account of the impetuous whirl of the tide in this neighborhood.

Whistle Buoy.—A whistle buoy, with can-shaped superstructure painted in black and white vertical stripes and marked "BLANCHARD," is moored at a distance of 200 yards 122° from Blanchard Rock.

Baleine Bay, on the southeastern side of Serk, between the Baleine and Conchee Rocks, may be resorted to in winter or summer, as it affords excellent anchorage in depths of from 3 to 7 fathoms sand, fine gravel, and broken shells, and good shelter with the wind from north by east round by north to west by south.

Notwithstanding the numerous overfalls and various discolorations of water which appear on all sides when approaching this bay, the only shoals are the Tetes de la Conchee, the Gripe, the Vingt Clos, the Balmee, and the Demie de Balmee.

The Tetes de la Conchee are the outermost of these, and never have less than 6 fathoms water over any part of them.

The Gripe, directly in the fairway of the entrance to the bay, has only 6 feet at low water springs; from it the Conchee is in line with the Goulet Rock 9°, and the Balmee on with the Pignon bears 251°.

The Balmee, which uncovers at a quarter ebb, lies within and westward of the Gripe, with the Baleine in line with the Coupee 233°, and the western side of the Burons touching the outer or northeastern part of Point Terrible. On this latter line, 150 yards northeast by north from the Balmee, is the Demie de Balmee, a small rock which dries 9 feet at low water.

The Vingt Clos Bank, 800 yards southward of the Balmee and extending 600 yards farther in that direction, is also about 600 yards eastward of the Etac de Serk. It consists of sand and shingle interspersed with rocks. One head at the northern end of the bank dries 3 feet and two others southward of it have only 3 feet over them at low water. The southern end of the Coupee in line with the Baleine 327° leads nearly 400 yards northeastward of the bank, and Doyles Column, open southward of the Etac de Serk 284°, leads southward. The sand and shingle of this bank is continually shifting, its inclination being entirely governed by tidal action and wind.

Directions.—From the eastward, Chateau Point opens southward of the Conchee leads into the anchorage of Baleine Bay northward of the Gripe; and, from the southward, Serk Mill open westward of Chateau Point 337° leads in between the Gripe and the Balmee; in either case, anchor when the western extreme of the Burons comes on with Point Terrible.

Greve de la Ville, on the northeastern side of Serk, is an anchorage affording good shelter for small vessels during westerly or southerly winds in depths of from 6 to 9 fathoms, but, the ground being sand and rock, the anchor is likely to come home unless riding with a long scope of chain. It has also this inconvenience: Should the wind suddenly shift to the northward or northeastward at low water, the tide running southward for 3 hours after that time, a sailing vessel could not possibly weather the strong in-draft of the Goulet Pass, the influence of which is perceptible ½ mile northeastward of it, and she must therefore either ride at anchor until the offing tide slacks, or, if hard pressed, must at least hold on until there is water enough over the neck of the Goulet.

Dangers off Greve de la Ville.—The Sardriere Rock, with 29 feet water, bears 68° 500 yards from the Bec du Nez. The Jolicot Rock dries 5 feet southwest 150 yards from the Sardriere, and the

Moulinet Rock dries 8 feet just eastward of the Bec du Nez, and only 50 yards offshore. The Jolicot and Moulinet bear east and west from each other, and are nearly 250 yards apart; there is a safe 6-fathom channel between them, in entering which from the westward be careful to have the peak of the Grande Moie well in sight eastward of Banquette Point before hauling in. Grande Moie Peak, in line with Banquette Point, just clears the Moulinet, and the same peak over the middle of the Pecheresse Rock leads over the Jolicot.

The Pecheresse bears 82° 500 yards from the rifle target on the summit of the Grune, and covers at high-water springs, but only to the depth of 2 feet; its inshore point is long and straggling, narrowing the channel between it and the island to 200 yards.

A rock with 7 feet water bears 57° nearly 200 yards from the Pecheresse, and another, the Grand Boue, which dries 3 feet 85° rather more than 200 yards from it.

The Pavlaison Rock, awash at low water, lies 26° 400 yards from the Noire Pierre, which rock, together with the Petite Moie and Grande Moie, off the southern side of the Greve de la Ville, have been described.

Directions.—There are two entrances to Greve de la Ville—one from the northward, between the island and Noire Pierre, and a very narrow one from the southward, between the island and Grande Moie. The leading mark from the northward is Noire Pierre, in line with the Chapelle, a remarkable hollowed rock, on the shore of which the upper part is whitewashed, bearing 188°, or the Chapelle, half a point open eastward of Banquette Point 167°; between these limits a vessel may also work in.

No leading mark can be given for the southern channel to this anchorage between Grande Moie and the island. It never has less than 3 fathoms, but a rock awash at low water lies 50 yards within the Grande Moie, and is connected with it under water; care must therefore be taken to pass nearer to Robert Point, which is steep-to, rather than in mid-channel. About 200 yards northward of Robert Point, also, a dangerous reef extends about 100 yards from the shore, and the Demie, a half-tide rock, lies the same distance 209° from Petite Moie.

Anchorage.—The best anchorage in Greve de la Ville is between Petite Moie and the island, with the eastern extreme of the Burons just open of Robert Point; outside this line the stream runs strongly; westward of it the stream is scarcely perceptible.

There is good anchorage on the northeastern side of Serk, outside all the rocks, in depths of from 14 to 19 fathoms, fine clean sand, with St. Martins Point, Guernsey, on with the Corbee du Nez, west; and the Chapelle Rock midway between Noire Pierre and Banquette

Point 175°. This anchorage, however, can only be used in fine weather, with the wind between west by south and south by west.

Banquette Bay, on the northwestern side of Serk, affords shelter against easterly, southeasterly, and southerly winds in depths of from 5 to 10 fathoms, coarse sand interspersed with small black stones and pieces of seaweed. Should the wind chop round to the westward, a vessel at anchor here may even then be able to weather the Bec du Nez, and from thence may push to sea or haul under the lee of the island.

In strong southeast winds the anchorage here is found most uncomfortable, and vessels roll considerably, owing to the very heavy swell thrown in by the tidal streams. Landing on the beach in Port du Moulin is impracticable.

There are several rocks and ledges in Banquette Bay, of which the principal are those now to be described:

Episseresses Rocks, with 13 feet water, bear 288° 500 yards from the outer Autelets Rock. Between the Episseresses and Port du Moulin are several dangerous rocks.

The Guillaumez Rock, which covers 6 feet at high water, bears 54° 600 yards from the Episseresses, and is about 100 yards offshore.

The Grune de Gouliot, with 6 feet water, bears north 350 yards from the eastern end of Brecqhou.

The Petite Banquette is a narrow bank of fine sand with a sharp ridgy apex. It is about 400 yards long, north and south, and has 16 feet on the shoalest part near the middle, from which the Platte Roque, off Port du Moulin, bears 85° 400 yards. In heavy gales from the northeastward or westward this bank has been reported to shift 200 yards or more in one tide.

Anchorage.—The best deep-water berth in Banquette Bay is in a depth of 9 fathoms, with Givaude Rock in line with Moie Batard 223°; Little Serk Mill, without arms, on with the western side of Gouliot Island; and, Manor Tower and north cliff of Port du Moulin in line.

Grande Greve is the anchorage on the southwestern side of Serk, between Brecqhou and Little Serk. It takes its name from the great beach of fine white sand under the Coupee uniting Serk with Little Serk. The approach to it is much encumbered by rocks, but there is plenty of room notwithstanding, and good shelter from southeast by south and northeast by north winds in depths of from 7 to 11 fathoms, fine sand and shells. It is not prudent, however, for a sailing vessel to remain at anchor here if the wind shifts northward or southward of the points specified; for a southwest by west wind, from the long sweep it commands, brings in a heavy swell, and the obstruction caused by the weather tide coming through the Gouliot

Pass raises it to such a height as to preclude the possibility of a vessel riding out even a moderate gale.

Should a vessel, therefore, be caught by a westerly wind at this anchorage, she should immediately endeavor to get out either to the westward or through the Gouliot Pass, which latter may, with confidence, be taken at half flood.

Dangers off the Grande Greve.—**The Hautes Boues** are a group of rocks off the northwestern side of Little Serk. The outer northwestern rock dries 4 feet and bears 284° 800 yards from the Moie de la Fontaine, a high rock close inshore and 59 feet above high water level; there is deep water close to the northern and western sides of this northwestern rock, but a string of dangerous rocks extends 700 yards from it in a 186° direction; there are also numerous rocks within this line to the eastward, of which several heads dry at low water.

There is no safe channel for large vessels eastward of the Hautes Boues.

The Dents, a rocky mass off the southwestern end of Brecqhou, are awash at high-water springs. They are steep-to and safe of approach from the southward.

The Baveuse is a large rock 352° 250 yards from the Moie de la Fontaine. It covers 4 feet at high water and is surrounded by other smaller rocks.

From the Baveuse, in the direction of the Gouliot Pass, there are several dangerous rocks, of which the Boue de Baie has only 3 feet, and another rock 150 yards northward of it only 2 feet water. From the Boue de Baie the Baveuse bears 186° 400 yards. The Chapelle, a large rock near Jeu Point, is in line with that point, and the Pierre au Norman appears in the middle of the chasm between the Moie du Gouliot and Tour Islet.

Directions.—The leading mark for the inner anchorage in the Grand Greve, passing northward of the Hautes Boues and southward of the Boue de Baie, is the northern apex of the cliff at the southern end of the Coupee, in line with Jeu Point 88°. Serk Mill on with the gap in the outer part of Longue Point 71°, or with the Pilcher Monument, a conspicuous mark on the top of the cliffs over Longue Point, leads southward of the Dents and northward of all dangers in the bay until the Pierre au Norman is in line with the eastern end of Brecqhou, which mark then leads southward to the anchorage. The best anchorage mark is the Pierre au Norman, in line with the eastern point of Brecqhou, and about two-thirds of the Coupee roadway open southward of the southeastern point of Serk. A good position in the outer part of the bay, in about 12 fathoms, is with Serk Mill on with Longue Point and the Givaude between Brecqhou and the Dents.

It should, however, be observed that as Serk Mill will be hidden behind the intervening highland of Longue Point before a vessel arrives abreast of the Dents, it is necessary to look out in time for another object in the same line of direction.

Tidal streams around Serk.—It is high water, full and change, at Serk at the same time as at St. Peter Port, viz, at 6h. 37m., and there is about the same rise and fall. The direction of the streams in the immediate vicinity of the island is subject to great variety, it being governed by the configuration of the land. On its northeastern side there is a space in which an eddy or slack tide exists during the whole of the six hours that the stream is running northeastward in the Great Russel and Deroute Channels. This expanse of slack water extends about 2 miles from the land, gradually contracting in width as it increases its distance from the shore. The marks for its northwestern and southeastern limits are the western end of Brecqhou Island on with the Corbee du Nez, and the Etac de Serk, just appearing eastward of the land at Le Creux. The ordinary limit of its distance from the land is attained when Vale Mill comes on with the Sardinias Rock off the eastern side of Herm. Outside the northwestern and southeastern limits here given, even at the distance of 200 yards, run the true Russel and Deroute streams.

The stream in Baleine Bay, in Terrible Bay, and in the neighborhood of the Conchee, Baleine, and Balmee Rocks runs northeastward 7½ hours and southwestward for only 4½ hours. The first begins an hour after low water by the shore and runs until 2½ hours ebb, when the southwestern stream commences and runs faintly for the remaining 4½ hours, or until an hour after low water again.

The streams on the northeastern side of Serk, in the Greve de la Ville and in the neighborhood of the Grande and Petite Moie Rocks, etc., run 8½ hours 153° and only 3½ hours 333°. The southern stream commences at 4 hours' flood and runs until half an hour after low water, when the northern stream commences and runs gently for the remaining 3½ hours, or until 4 hours flood again.

The southern stream above mentioned on the northeastern side of Serk and the northern one on the southeastern side branch off to the eastward of the Burons, where they meet and unite with the Deroute stream, which sets directly both ways and runs for equal periods of time on both tides. A curved line drawn from 600 to 800 yards southward of the Etac de Serk through the Grune Noire to the southeastern limit of the space of slack water before mentioned, on the northeastern side of the island, divides the irregular streams inshore from that of the Deroute; and this line continued from this spot close round the Bec du Nez toward the Givaude Rock, and from thence to within 600 or 800 yards of the Etac de Serk again, divides the regular Russel stream from the irregular streams within it.

The stream on the northwestern side of Serk begins to run to the southward at the Bec du Nez, and from thence along the land toward Brecqhou Island, at three-quarters flood; near Brecqhou, it meets with the stream from the Gouliot Pass, which latter prevailing, carries it with a curve northwestward into the Great Russel, where it unites with the regular stream. The stream begins to run northeastward along the shore of the Moie du Gouliot toward Bec du Nez at three-quarters ebb, and so continues until three-quarters flood again.

On the southwestern side of Serk during the first hour's flood by the shore the stream sets in a southwesterly direction; during the second hour it changes to the southeastward. From the third to the sixth hour it runs eastward and northeastward. During the first hour of the ebb by the shore the stream sets in a northeasterly direction, the second hour it changes to the northwestward, from the third to the sixth hour it runs westward and southwestward.

The stream in the Gouliot Pass runs for equal spaces of time corresponding to that in the Great Russel, and does not partake of the irregularity of the tides in its vicinity. On the contrary, the force and shape of the flood stream, acquired by the contracted and peculiar form of the channel between Serk and Brecqhou, is continued until it falls into the Russel Channel; the same is the case with the ebb until it unites with the stream southwestward of the Hautes Boues.

Oyster ground.—About 12 miles in a 17° direction from Coupe Point, the northeastern extreme of Jersey, and about the same distance in a 96° direction from the middle of Serk, is an extensive oyster ground, the marks for which are as follows: The Island of Jethou in line with the Bec du Nez, Serk; Rozel Mill, Jersey, on with the Burons de Drouilles; and the two high heads of the Pierres de Lecq in line with Point Grosnez. There is very little difference in the depths of water in its neighborhood.

CHAPTER VIII.

CHANNEL ISLANDS—THE CASQUETS, BURHOU ISLAND, ALDERNEY ISLAND, BANC DE LA SCHOLE, AND ALDERNEY RACE.

The islands and rocks which occupy so large a portion of the space between Ile de Brehat and Cape de la Hague extend northward as far as the parallel of that cape, where their northern portion forms a chain 9 miles long 271° and 91° and 3 miles wide. This chain is formed by three distinct groups, viz, the Casquets Islets and rocks at its western end, the Island of Alderney at the eastern end, and Burhou Island and its rocks in the center. They are separated from the coast of France by the Race of Alderney, a channel 8 miles wide, and from the Island of Guernsey and its islets by a space about 12 miles wide.

Casquets Islets and Rocks, so named, probably, from their remarkable helmet or cap like appearance, form a group ½ mile in length 276° and 96° by from 200 to 400 yards in width. The largest and highest of the rocks is a mass near the center of the group from which Alderney old telegraph tower bears 99° rather more than 6 miles. On this rock stand the lighthouse and two other stone towers; all three towers were lighthouses until 1877, when the northwestern tower was raised to its present height and maintained as the lighthouse, the eastern tower was reduced in height and converted into the fog-signal station, and the southern tower reduced in height and made into a storehouse. The rocks are 90 feet above high water, and at low water all this central mass is connected and extends 600 yards in a 276° and 96° direction, with a width of 270 yards at its widest part, abreast of the lighthouse. Eastward from this central mass for 300 yards lie six high rocks detached from each other at low water by narrow gullies through which the tide rushes with great velocity. The eastern rock is the Colotte; it is 33 feet above high water and very steep-to.

The entire group is as steep as a wall on the southern and eastern sides, though separated on the latter side by only 400 yards from the Fourquies Rocks, which dry 13 feet; but on the northern side, between Point Colotte and the lighthouse, are two small detached heads which uncover at low water; they are, however, only 50 yards distant from the central mass. On the western side rocks, presently described, extend nearly 800 yards and render that side dangerous of approach.

Light.—From the white lighthouse, 75 feet high, the highest or northwestern of three towers, is exhibited, at an elevation of 120 feet above high water a group-flashing white light. The light is visible in clear weather 17 miles, and in thick or foggy weather its intensity is more than doubled.

Fog signal.—During thick or foggy weather a powerful siren at the eastern tower is sounded.

Landing.—The Little Casquet Rock, about 150 yards southward of the lighthouse and 53 feet above high water, shelters a landing place for boats on the main rock at an inlet named Petit Havre; there is also a landing place on the eastern side of Little Casquet Rock, and another in a rocky bight on the northern side of the main group.

The possibility of safe landing at either of these places is communicated to an approaching vessel by the hoisting of a flag on the platform staff between the towers. When landing can be effected at Petit Havre, a square blue flag is hoisted; when at the southern cove on the eastern side of the Little Casquet, a square white flag with red St. George's cross; and when at the northern landing place in the northeastern cove, a square red flag. When no flag is shown, landing is not considered to be safe anywhere.

The following are the rocks lying off the western side of the Casquets:

Auquiere Rock, 150 yards 276° from the western end of the main group, is about 65 yards in diameter and 44 feet above high water. Sunken rocks extend 60 or 70 yards northward, westward, and southward of the Auquiere. There is a boat channel between it and the main group of the Casquets, but it is very narrow, owing to a ledge of sunken rocks extending nearly half way across from the western point of the group, and it is rendered still more dangerous by other rocks to the southward which dry at low water; it should only be used, therefore, in cases of urgent necessity.

Noire Roque and ledge.—Noire Roque or Black Rock, lies 248° 670 yards from the lighthouse, and 229° nearly 400 yards from the Auquiere; it is about 50 yards in diameter, about 12 feet above high water, and is craggy and unapproachable. Noire Roque Ledge, with only 8 feet water, lies 291° 250 yards from Noire Roque. Its position is generally indicated by a strong ripple, and, with any swell, the sea breaks furiously over it. There is also a sunken rock with only 4 feet water midway between Noire Roque and the Auquiere; no vessel, therefore, should attempt to pass between them.

Eight-fathom ledge.—Two hundred and seventy-nine degrees 1,400 yards from the Auquiere is a bank of sunken rocks, on which there is said to be as little as 8 fathoms. The bank is from 40 to 50 yards in extent and rises suddenly from soundings of 25 and 27 fathoms; although it can not be touched by vessels even of the deepest draft, it is dangerous, for it causes violent eddies at all times, and during fresh winds the sea breaks on it.

Anchorage can be safely attempted only on the southeastern side of the Casquets, and while the southwestern stream is running, and then only by a steamer. The best spot is in a depth of 15 fathoms, fine sand; the northeastern tower bearing 321°, and the north side of Fort Albert, Alderney, touching the Ortac Rock seen between the Equet and Fourquie Rocks.

This position, although only 250 yards from the rocks, is quite safe in fine weather when carefully taken up; it is sheltered from the tide by the Casquet Rocks. At 100 yards within it the depth is 8 fathoms and at the same distance outside 23 fathoms.

Caution.—The great strength of the tidal stream near these rocks renders an incautious approach to them during foggy weather extremely hazardous; it is therefore recommended at such times never to run for them with the tide, but either to wait for slack water or until the stream in its usual rotatory changes turns from the desired direction, or to get to leeward of the rocks in order to approach them against the stream. Should a shoal cast be obtained when running for the Casquets in thick weather, the vessel's head should be immediately turned against the stream; after which, haul out cautiously into deep water.

Fourquie and Equet Rocks.—A bank of pebbles, sand, and broken shells, with from 6 to 10 fathoms water, extends nearly a mile 96° from Colotte Point; the Fourquie, before mentioned, separated by a channel only 200 yards wide from Colotte Point, is near the western end of this bank, and the Equet near its eastern end. The Fourquie dries 13 feet and is steep-to except on its eastern side, where there is a detached sunken rock. It bears 96° 1,150 yards from the lighthouse and 108° 500 yards from Colotte Point. The Equet is rather a long, straggling, and dangerous rock; its northeastern head is the highest and dries 7 feet; this head bears from Casquets Lighthouse 95° 1.1 miles. A detached rocky bank with as little at 5½ fathoms lies from 400 to 700 yards eastward of the Equet.

There is no safe channel between the Fourquie and Equet Rocks, nor is it safe to approach the eastern side of the latter nearer than ½ mile. Whirling eddies, thrown up by the tide rushing over the rugged bottom at these parts, render a vessel involved in them quite unmanageable. The streams set fairly through the channel between the Fourquie and Colotte Point, and there is a depth of 10 fathoms over a tolerably even bottom; a steamer may, therefore, safely pass through in fine weather; but, near spring tides, with any swell on, it is not prudent to attempt it.

Southwestward and southward of the Casquets are several extensive banks on which the least known depth is 4 fathoms, but from the overfalls and heavy sea over them in bad weather they are then very dangerous; they seem to be formed by a deposit caused by the turn of the stream between low water and half flood, for near them at this time the last of the west-going Channel stream, after passing between the Ortac and the Casquets, meets the southeasterly stream then running southwestward of the Casquets. A description of these banks now follows.

Casquet Southwest Bank.—The shoalest spot of 4 fathoms on this bank lies 206° 4.5 miles from Casquets Lighthouse. The bank is of fine gravel, sand, and shells, 3¾ miles in length within the 20-fathom curve, in a 6° and 186° direction, and nearly a mile in width.

The highest part of the bank is near the middle, close to its western side; the 10-fathom line here includes a space just 2 miles long and barely 500 yards wide, the shoal part of 4 fathoms being ½ mile within its southwestern end. From the shoalest spot, Alderney old telegraph tower bears 70° and Doyles Column is in line with the northeastern extreme of Guernsey 198°. Doyles Column in line with Vale Mill 192° leads rather more than a mile westward of the southwest (mag.) bank.

The channel between the southwest (mag.) and south-southwest (mag.) banks is from 1 to 2 miles in width and has from 22 to 29 fathoms water.

Casquet South-southwest and South-southeast Banks are steep ridgy banks of fine sand eastward of the southwest bank and lying nearly across the southwestern entrance to the Ortac Channel. The northern point of the south-southwest bank in 18 fathoms bears 203° nearly 1.5 miles from Casquets Lighthouse, and from this it extends due south rather more than 2 miles, after which the tail of the bank turns off to the eastward, the water deepens, and again shoals in joining the southwestern end of the south-southeast bank. The south-southwest bank is 500 yards wide within the 20-fathom curve; it has a short, ridgy apex, with depths of from 12 to 13 fathoms, and 11 fathoms on the shoalest part, near the middle.

The Casquet South-southeast Bank is 1.8 miles long within the 10-fathom line in a 30° and 115° direction and very narrow; its southwestern end, after the water deepens to 18 fathoms, as before explained, turns off westward and unites with the south-southwest bank. The shoalest water is about a mile in extent; it has a depth of

4½ fathoms at its northeastern end and only 4 fathoms at its southwestern end, with irregular soundings of from 5 to 8 fathoms between. From the northeastern shoal spot of 4½ fathoms Tourgis Beacon, over the middle of Clonque Fort, bears 61°, and, the southern end of Clonque Fort and Tourgis Fort Beacon in line 59° (the mark for the Pierre au Vraic), passes over the bank midway between the shoal spots at its extremes. From the northeastern end of the 10-fathom curve Casquets Lighthouse bears 307°, distant nearly 3 miles, and from the southwestern extreme 334° 3.5 miles.

The shoal spots are difficult to pick up, being generally the summits of sharp ridges of sand and very steep; the ridges appear to run rather across the bank in a 96° and 276° direction, but in all probability they shift with the turn of the tide.

Anchorage.—Vessels should avoid anchoring on the SSW. bank, there being at all times a strong ripple over it; but on the SSE. bank, in fine weather, vessels cruising in the vicinity may find fair anchorage in depths of from 6 to 10 fathoms, with the Ortac Rock midway between Renonquet and Verte-tete 26° and Casquets Lighthouse 321°.

Clearing marks.—To clear the Casquet Southeastern Bank southward of the 10-fathoms curve, keep the Etac de la Quoire open 6° southward of the Orbouee Rock 66°. To clear it to the northward, the inner top of the Great Coque Lihou touching the northern side of the Coupe Rock 85° leads 1,100 yards northward of the northern shallow spot, in a depth of 10 fathoms. Verte-tete behind the Ortac 18° leads clear to the eastward; and the western side of Renonquet on with the eastern side of the Ortac Rock 35° leads clear to the westward.

Casquet Middle Bank is about midway between the northern parts of the SSW. and SSE. banks; it is nearly circular, about 800 yards in diameter, and has from 15 to 20 fathoms water, over a bottom of gravel and broken shell.

The general depth round all the Casquet Banks is from 22 to 25 fathoms.

Pommier Banks, on the western side of the Ortac Channel, are two extensive and dangerous groups of sunken rocks, divided by a narrow 12-fathoms channel. The highest head is near the western end of the western bank; it has only 13 feet water and lies 56° 1.5 miles from Casquets Lighthouse. From it the Ortac Rock appears midway between Alderney old telegraph tower and the southwestern brick kilns 112°, and Casquets Lighthouse and northeastern tower are nearly in line. From this 13-foot rock the eastern end of the eastern bank bears 80° 1 mile. The least known depth on the eastern bank is 5 fathoms, but there may be 2 or 3 feet less.

Clearing marks.—The northeastern and southeastern Casquet Towers, in line 209°, lead 1,400 yards northwestward; the Noires Putes, midway between the Ortac Rock and Renonquet 133°, leads 800 yards eastward of the eastern bank; and St. Anne's Church steeple, in line with the Ortac 99°, leads ½ mile southwestward of them and 400 yards southward of the Danger Rocks. It is also the best leading mark for entering the Ortac Channel between the Pommier Banks and Equet Rock.

Danger Rocks, with 21 feet water, lie about ½ mile southward of the Pommier Banks and 77° 2 miles from Casquets Lighthouse. These rocks are about 110 yards in extent east and west, but there may be a few feet less water on them than that given. They must therefore be approached with caution.

The channel between Danger Rocks and the Equet Bank has a depth of 15 fathoms and is about 1,400 yards wide. It is therefore quite safe in fine weather, but in bad weather, and especially at spring tides, no vessel should attempt it. At such times neither this nor any of the channels between the Casquets and Ortac should be used, for the entire space is then covered with tremendous overfalls, in which the largest vessels are quite unmanageable. Even during fine weather there are overfalls, but being then confined to the shoalest parts they serve to mark the positions of the highest rocky heads, and thus rather contribute to the safety of the navigation.

Speedy Rock, 338° 900 yards from the Verte-tete, marks the northern boundary of the Ortac Channel on its eastern side. The shoalest part known has 5½ fathoms water. From it the outer high rock of the Etacs, in line with the high central rock of Renonquet, bears 141°, and Fort Albert Flagstaff, the apparent breadth of the fort, opens southward of the Great Nannel 105°.

Verte-tete Reef, northeastward of the Ortac Rock, marks the northern extreme of the dangerous rocks, stretching northwestward more than a mile from the western end of Little Burhou Islet. There are three high rocks on this reef, of which the Cone Rock is the westernmost. It bears 12° 1,600 yards from the Ortac Rock and 77° 3.5 miles from the Casquets Lighthouse. It is of sugar-loaf form and about 20 feet above high water. It is detached from the main reef and is very steep-to on its northern side, but 150 yards westward of it a small pointed rock uncovers 6 feet.

The Verte-tete Rock, which gives its name to the reef, is 13 feet higher and much larger than Cone Rock; it has two heads; the southwestern and highest is flat at the top; the other, about 50 yards northeastward of it, being lower, smaller, and peaked. A reef, dry at low water, extends nearly 200 yards eastward of the high head of Verte-tete, and a sunken rock bears 51° about 200 yards from it.

With the exception of the dangers described, those of the Verte-tete Rocks which are always above water, are very steep-to on the northern side.

Ortac Rock.—At 3.3 miles 89° from the Casquets Lighthouse is this remarkable, huge, and nearly inaccessible rock; it is 79 feet above high water, and may be seen in clear weather at the distance of 9 or 10 miles. Its southern side is steep-to, having 8 fathoms within 100 yards of the rock; but a sunken ledge, with only 11 feet at its outer edge, extends 350 yards 288° from the rock, and from it Clonque Fort is just in sight southward of the Ortac. From the highest part of a ledge with 14 feet water, 150 yards southwestward of the Ortac, Fort Albert flagstaff is just in sight southward of the Ortac Rock. To pass westward of these ledges when coming from the southward, keep Fort Albert flagstaff well open southward of the Ortac until Verte-tete bears 40°.

Between Ortac, Verte-tete, and Burhou Island are scattered many dangerous sunken rocks and ledges, near and among which the streams run with great velocity.

Ortac Channel is bounded on its eastern side by the Ortac Rock and Ledge just described and by the rocks extending from Renonquet and Verte-tete, with the Speedy Rock as its northern and eastern boundary; and on its western side by the eastern Pommier Bank, Danger Rocks, and the Equet Reef already described. There is also near midchannel the Dasher Rock, with 6½ fathoms water, from which the Great Nannel Rock is a little open northward of the high head of Renonquet 82°; and the outer high rock of the Etacs, off the western end of Alderney, touching the northeastern side of the Ortac, bears 120°. Vessels may pass on either side of the Dasher Rock, but the eastern side is best. The northern entrance of the Ortac Channel, between the eastern Pommier Bank and Speedy Rock, is more than a mile wide; its narrowest part, eastward of the Dasher Rock, is about 1,100 yards in width.

Depths.—The general depth in this channel, with the exception of the Dasher Rock, of 6½ fathoms, is about 15 fathoms, with tolerably regular soundings, but the bottom is rocky and foul throughout; anchoring, therefore, except when unavoidable, is not to be thought of.

Directions.—To pass through the Ortac Channel from the northward, bring the Ortac Rock to bear 156° and steer direct for it on this bearing, and when the Great Nannel comes in line with the Verte-tete 194° steer 192°, which course leads through the channel about 600 yards westward of the outer part of the Ortac Ledge. When the Great Nannel is nearly on with the northern part of the highest head of Renonquet, a vessel is abreast of the Dasher Rock, southward of which the deep-water channel is nearly 1.8 miles wide. When bordering on the northern side of the Ortac Rock the ledge off it may be cleared by not bringing the Great Nannel nearer to Burhou Reef than the middle of the water gap or channel between it and Renonquet; when Fort Albert is open southward of the Ortac Rock a vessel is southward of the Ortac Ledge; and when Noir Houmet, a high rock on the southern side of Burhou Island, opens southward of the Ortac, she is clear of the Equet and of all danger to the southward.

Tides.—It is high water, full and change, at the Casquets and at the Ortac Rock at 6h. 45m.; equinoctial springs rise 24 feet, ordinary springs 15½ feet, and neaps 10 feet.

Tidal streams. — Although the tidal stream in the immediate neighborhood of the Casquets preserves the rotatory character so frequently alluded to, it varies much in strength and direction, according to position. On their northern side and to the eastward, for instance, when outside the influence of the Ortac Channel, the slack and change of stream takes place as in the offing, the great body of the flood setting east-northeast and the ebb west-southwest, but westward of the Casquets the strength of the stream is principally felt in three different directions, viz, at 2½ hours flood by the shore, south by east, 3.7 knots; at 1 hour ebb, northeast by east, 3 knots; and an hour before low water, west, 3.1 knots; between these points a continuous stream sets westward, southward, and eastward, the only slack occurring between 3 and 4 hours ebb.

On the southwestern side of the Casquets, between half ebb and low water, there is an eddy nearly 2 miles wide and of considerable strength. Between low water and 2 hours flood this eddy extends farther eastward and increases in width, and for a time it thus continues, but gradually becomes weaker and finally disappears at about half flood. Eddies exist also on the northeastern side of the Casquets, but their action is exactly the reverse of those on the southwestern side.

In the Casquets Channel—that is, in its immediate draft—the stream begins to set southwestward exactly at half ebb by the shore, and runs in that direction for 6 hours, or until half flood; and the contrary is the case with the northeastern stream, for there is neither high nor low water slack here.

In the Ortac Channel the stream runs with great strength, especially near high or low water, at springs, when it attains a velocity of 7 knots or more; it begins to run northeastward at half flood, gradually turns more northward after passing the Ortac Rock, and sets 6° until it again unites with the stream flowing eastward past the northern side of the Casquets. The southwestern stream of this channel, which commences at half ebb, sets right over the Equet and the Fourquies, to avoid which rocks the utmost care must be taken.

On the southwestern side of the Ortac Rock there is an eddy nearly 1.5 miles in extent between half ebb and one hour's flood, after which the stream on the southern side of the Ortac gradually inclines westward, setting directly for the Casquets at 2 hours' flood, until it runs into the last of the southwestern stream in the Casquets Channel. There is no eddy of consequence on the northeastern side of the Ortac Rock.

In the course of the rotatory changes of direction of the streams they at times set across the Ortac Channel, and although their strength then decreases, an incautious pilot might soon be swept amongst dangerous rocks. In fact, it should be understood that the Ortac, as well as all other channels in this vicinity, are always more or less hazardous for sailing vessels, and even for steamers, unless those in charge have good local knowledge.

Burhou Island lies 74° 1.3 miles from the Ortac; it is nearly level toward the middle, though huge rocks crop out near the extremes, and it is fringed with reef. The western part of Burhou is cut off from the main part at high water, the portion thus detached being called Little Burhou. The two islands together are 1,200 yards long, east and west, and nearly 400 yards wide, their rocky peaks being about the same height, 83 feet above high water; they are covered with a light soil, on which grow coarse grasses and a variety of wild flowers. The soil is burrowed in every direction by rabbits, formerly very numerous, but now nearly exterminated by the Alderney fishermen; their holes are now frequently the breeding places of various kinds of sea birds, and, among others, of the stormy petrel, which resorts to these islands during the breeding season.

There is a small anchorage on each side of the island and a refuge for fishermen and shipwrecked mariners on the low saddle near the middle. The landing places are in two small coves near the refuge, one on either side of the island. No fresh water can be obtained except such as may be deposited by rain in the interstices of the rocks.

Burhou Reef.—The eastern side of Burhou is clear of danger to within 250 yards, but a reef extends ½ mile westward of Little Burhou, and the whole of it, with the exception of a few rocky heads, covers at high water. Numerous detached rocks lie along the edge of this reef on both its southern and western sides.

There is a 5-fathom channel between Burhou Reef and the rocks extending 800 yards eastward of the Ortac Rock, and also a very narrow channel, called the Passe de la Maure, northward of Burhou Reef and leading into the Little Swinge. Only the most expert pilots amongst the Alderney fishermen can navigate either of these channels with safety.

Dangers northward of Burhou Island.—The following rocks and ledges lie northwestward, northward, and northeastward of Burhou Island, effectually closing all approach to it from that direction except by one narrow channel between the Maquereaux Reef and the Nannels.

Renonquet Reef, on the northern side of the Passe de la Maure and 400 yards southward and southeastward of the Verte-tete, is about 1,200 yards long east by north and west by south. Its western end is low and covers with the tide for 700 yards, but near the eastern end is a group of high rocks, about 300 yards in diameter, which never cover. The highest of this group is 43 feet above high water and lies about 600 yards southeastward of the high head of Verte-tete, in line between it and the peak of Little Burhou.

White Rock is 500 yards eastward of the highest Renonquet; it is small, 20 feet above high water, steep-to, and safe of approach on its northern side. Only one other rock eastward of this, near the Renonquet group, is visible at high water. This is a small head, 12 feet above high water, one of a large field of drying rocks, 102° 300 yards from White Rock.

The White Rock eastward, the Verte-tete westward, and the Renonquet Rock in the middle, form a remarkable group for recognition by the mariner set in here during foggy weather.

Maquereaux Rocks, a sunken reef 400 yards in extent north by west and south by east and 200 yards wide, is 900 yards eastward of the White Rock; three heads near the middle of the reef are covered with only 4 feet at low water, and there is no safe channel through the chain of rocks between the Maquereaux and Verte-tete. The outer Etac in line with the saddle rock of Burhou just westward of the refuge, bearing south, leads eastward of the Maquereaux Rocks; and the Casquet Towers their apparent breadth open northward of Verte-tete 255° lead 200 yards northward of them, and of all the dangers northward, northwestward, and northeastward or Burhou.

Anchorage.—The eastern clearing mark given, the outer Etac in line with the saddle rock of Burhou, is also the best leading mark with which to run in for the anchorage on the northern side of Burhou should a vessel be compelled to use it; in such a case, anchor in a depth of 7 fathoms, sand, a little westward of the leading line, with the outer Etac between it and the western peak of Burhou; and the Ortac, on with, or just southward of, the northernmost high-water head of Burhou Reef.

The Nannels is a reef about 800 yards long east and west and 500 yards wide; it forms the northeastern part of the Burhou Group, and consists of enormous and curiously shaped rocks of which some are always above water and others are tidal. The Great Nannel, the highest, is 62 feet above high water and is near the middle of the southwestern part of the reef. The Little Nannel, the next in height, is only 16 feet above high water, and is at the northwestern end of the reef 200 yards distant from the Great Nannel.

Other but smaller rocks above high water extend 400 yards in an easterly direction from the Great Nannel. The end of the group in this direction is the Pierre de But; this rock covers near high water. The Boues de But, two sunken rocks having 9 feet over them, lie 70 yards eastward of the Pierre de But. The Cordonnier, a small rock drying 3 feet, lies 250 yards southward of the Great Nannel.

The width between Burhou and the Nannels is just 400 yards; the **Equet, a rock near the middle at the outer edge of shoal ground extending northeastward from Burhou, and which dries 6 feet at low water, divides the passage into two channels through which the tide rushes into the Little Swinge with great velocity.

The Emproue Reef, 6° 600 yards from the Great Nannel, is 300 yards in length east by north and west by south by 150 yards in width; it has four rocks which uncover, the highest only 2 feet, and other rocks awash. The sea breaks furiously on this reef with fresh northwesterly winds. Round Rock dries 9 feet midway between the Nannels and the Emproue.

Clearing marks.—The Casquet Towers open their own apparent breadth northward of Verte-tete 255° lead, as before remarked, northward of all the rocks of the Burhou Group, including the Emproue Reef, and of the Nannels, a close mark for the former. The sextant angle, Quenard Lighthouse 110° Casquets, clears the whole groups of islands westward of Alderney.

Swinge Channel—Depths.—This channel divides Burhou Island and its rocks from Alderney; it should only be used in clear weather and under generally favorable circumstances. Its narrowest part is included in the space bounded by the rocks fringing the southern shore of Burhou Island, including North Rock on the one side, and by the Barsier and Corbet Rocks on the other. It is here only ½ mile in width, but when past these rocks in either direction it soon widens. The bottom is rocky throughout and very uneven; the depth at its narrowest part is from about 7 to 11 fathoms. There are several dangerous rocks, presently described, in the Swinge, and there is much broken water, even in the calmest weather, caused by the rapidity of the stream over the rugged bottom. There are also two overfalls, caused solely by the tide, of which the danger is much increased in bad weather. During easterly winds, on the northeastern stream, overfalls extend nearly across from Burhou Island to the outer end of Alderney Breakwater. With westerly winds, on the southwestern stream, they extend from the Ortac Rock to the Etacs. Both may be avoided by following the directions hereafter given.

Dangers in the Swinge.—Approaching the Swinge from the southwestward, besides the Ortac Rock and other dangers already described on the northern side, are also the Boues des Kaines and North Rock, with other rocks inshore of them adjacent to Burhou Island. Near the center of the entrance is the Pierre au Vraic, with Ellis and Richards Rocks to the eastward; and on the southern side of the channel, bordering the coast of Alderney, are the Etacs Banks, South Rock, and the Barsier and Corbet Rocks, before mentioned as being at the narrowest part of the Swinge, besides many other rocks and ledges closer inshore.

Boues des Kaines.—The outer head of these rocks is awash at low water; it lies 192° 600 yards from the high water rocky mass at the southwestern end of Burhou Reef; from it Fort Albert flagstaff, just inside the outer end of Grosnez Fort, bears 85°; and Long Rock a little open westward of the southwestern rocky mass of Burhou Reef 9°. There is a channel between these rocks and the Burhou Reef a little more than 200 yards in width.

North Rock, with 11 feet water, lies 400 yards from Noir Houmet, off Burhou Island; from it the Great Nannel is seen in the gap just within the easternmost high semidetached rock of Burhou, bearing 9°; and the Ortac Rock, just open southward of the half-tide reef, southwestward of Noir Houmet 264°.

Anchorage.—The entrance to the anchorage on the southern side of Burhou Island is just westward of the half-tide reef of Noir Houmet; vessels find excellent shelter here in a depth of about 5 fathoms during the southwestern stream.

Pierre au Vraic.—This dangerous rock, which dries 5 feet at low spring tides, is immediately in the stream of the Swinge Channel; from it Casquets Lighthouse bears 295° 4 miles; the Ortac Rock, 350° 1.8 miles; and the outer and highest Etac, 68° 1.8 miles. In form and size this rock is like a small boat bottom up, and it is surrounded by deep water; at 300 yards both southward and westward of it the depth is upward of 20 fathoms, and within that distance, as also inshore of it, from 14 to 16 fathoms.

The marks for the Pierre au Vraic are the inner peak of Coque Lihou on with the Coupe Rock 85°, and the conical beacon on the slope of the high land just within Fort Tourgis in line with the southern end of Clonque Fore 59°; these marks are also used to clear the rock on either side. Tourgis Beacon on with the northern end of Clonque Fort leads 400 yards northward of the Pierre au Vraic. By night Cape de la Hague Light opening and shutting in with the southern end of Alderney also leads close northward of it.

Richards and Ellis Rocks are on a rocky bank about ½ mile southeastward of the Pierre au Vraic. Richards Rock has 5½ fathoms water, and there is a depth of 22 fathoms within 200 yards southward of it; from the rock the outer Coque Lihou, a little open northward of the inner Noire Pute, bears 80°, and the Great Nannel, just within the outer eastern high rock on Burhou, 14°.

Ellis Rock bears 338° 500 yards from Richards Rock; it appears, however, to have nothing less than 8½ fathoms water. The Great Nannel, in line with the eastern end of Burhou, leads 500 yards eastward of Richards Rock. Large ships should not pass between Richards Rock and the Pierre au Vraic.

The Etacs Bank is nearly ½ mile 265° from the Etacs Rocks; the least-known depth, 26 feet, is near the southern end. To pass outside this bank keep the highest Noire Pute open westward of the Coupe Rock until the Great Nannel is over the eastern end of Burhou Island, or until Tourgis Beacon comes near the northern end of Clonque Fort.

South Rock, with 5 fathoms, lies with the western end of the highest Noire Pute touching the eastern side of the inner rock of the Etacs 153°, and the northern upper extreme of Fort Albert a little open southward of the inner part of Grosnez Fort 77°. There is another head, with 5½ fathoms, at the western end of this same rocky bank; it bears from South Rock 223° 500 yards.

Both of these heads may have less water than is here given; in approaching them from the westward it is useful to remember that you can not pass over the western head so long as the highest Noire Pute is in sight westward of the Etacs, and proceeding eastward you are clear of the eastern head when the whole of the highest Noire Pute is eastward of the inner rock of the Etacs.

Barsier Reef is a dangerous rocky group northward of the Clonque Rocks, from which it bears 333° 800 yards. The eastern heads of the Barsier dry 5 feet and the western head is just awash at low-water springs. The eastern head of the highest Barsier bears 220° 400 yards from the Corbet Rock; the western head of the reef is on the same bearing 150 yards from its eastern head. The eastern head of the outer Noire Pute in line with the western end of Alderney 165° clears the western side of the Barsier Reef by 100 yards, and Fort Albert flagstaff a little within the southern end of Grosnez Fort leads clear of its northern side about the same distance, but directly over the reef inshore of the Corbet Rock.

Corbet Rock lies 356° ½ mile from Clonque Fort and the same distance 282° from Tourgis Point; it is never wholly covered, though at very high springs it is awash. There is a small detached rock outside the Corbet which dries at low water; it is 40 yards distant, with the Corbet Rock and Tourgis Fort in line. The Corbet is attached to Alderney by a dangerous low-water ledge of scattered rocks, and both tidal streams run over this ledge with great rapidity.

The long western mark for the Corbet is the northeastern Casquets Tower a little open southward of the Ortac Rock 271°, and the southern extreme of the Casquets just shut in with the southern side of the Ortac leads northward of the Corbet and through the narrows of the Swinge. Between the Corbet and the eastern end of Burhou, the streams rush with great velocity, and during a weather tide the sea breaks nearly across the Swinge; the smoothest water then is generally near the Corbet.

Other rocks and shoals nearer inshore off the northwestern and northern coasts of Alderney are fully described elsewhere.

Directions — From the southward through the Swinge.— Steer for the southwestern end of Alderney, and on approaching the Pierre au Vraic be careful to open Tourgis Beacon northward of Clonque Fort in order to pass northward of it, or to pass inside and southward of the Pierre au Vraic, bring Clonque Fort in line with the western end of the Etacs until the Great Nannel just within the eastern end of Burhou bears 9°, which marks lead eastward of Richards Rock and close outside the Etacs Bank and the Boues des Etacs, but over the 5½-fathom patch 223° 500 yards from South Rock. After passing Richards Rock or when the outer Coque Lihou is a little open northward of the inner Noire Pute 80°, bring Great Nannel further within the eastern end of Burhou, bearing 12°, and proceed with the latter leading mark until Fort Albert flagstaff is a little within the southern end of Grosnez Fort; the vessel is then northward of the South Rock and of Barsier Reef and may pass the Corbet Rock at the distance of 200 yards if desired.

After passing the Corbet a course may be shaped out into the English Channel or for Alderney Harbor, bearing in mind, in the latter case, that nearly half of the breakwater at its outer end having been washed away its remains form a dangerous submerged reef, for which a good clearing mark is the Ortac Rock, seen between Noir Houmet and Burhou Island; the chief dangers southward of this line are the Jumelles Rocks.

Large ships should pass westward of the Pierre au Vraic and up through the middle of the Swinge on the western side of the South Rock Bank and 300 or 400 yards northward of Corbet Rock, along which route no depths less than 8 fathoms will be met with, clearing the outlying rocks in passing by the marks given in describing those dangers.

By night it is useful to remember that the Casquets Light is masked by the Ortac Rock when bearing 269°. The line of eclipse on the southern side of the Ortac passes nearly 200 yards northward of the Corbet Rock. The Casquets Light is seen again on the northern side of the Ortac, at the distance of 250 yards northward of the Corbet Rock.

The tidal stream must be carefully considered and allowed for in navigating the Swinge. The first of the east-going streams sets on Alderney, but after high water it turns off to the northward and northwestward. Therefore, entering the Swinge from the southward, it is advisable under ordinary circumstances to pass westward of the Pierre au Vraic on the first of this stream and eastward of it at the latter part. In thick weather, however, the Alderney shore should be closed with, but cautiously at all times, and the vessel anchored on or near the Orbouee Bank or in the West Bay anchorage until clear enough to proceed. No vessel should attempt to pass through the Swinge with the tide in foggy weather, for at springs the stream runs from 7 to 8 knots, and under such circumstances it is evident that should a vessel come suddenly into danger her destruction would be inevitable.

The strength of the stream in the Swinge—that is, between Burhou Island and the Corbet Rock—sets straight through both ways at high and low water. Like the stream in the Casquet Channel, it begins to set westward at half ebb exactly, and runs in that direction for 6 hours, or until half flood, and the contrary is the case with the east-going stream. Westward of the Narrows a branch of the east-going stream sets through between Burhou Island and the Ortac Rock, especially after high water by the shore, and eastward of the Narrows it curves around the Emproue to the northward and northwestward, where both branches, uniting with the Casquets Channel stream and ultimately with that of the English Channel, again set eastward. The last two hours of the west-going stream in the Swinge gradually veers toward the south as it recedes from the draft of the Swinge Passage. The average velocity of the east-going stream during springs is 7¼ knots; that of the west-going stream 6½ knots.

When passing through the Swinge from the northward on the first of the west-going stream proceed along the Alderney shore, past the Etacs, and eastward of the Pierre au Vraic. After low water keep Burhou Island and the Ortac Rock aboard, taking care to clear the North Rock and Boues des Kaines, and making due allowance for the set of the southeastern stream, which will be met with after clearing the Casquet Banks.

In westerly gales it is particularly necessary to take the above-prescribed routes to avoid the overfalls, which shift their positions through a regular course, according to the direction of the stream. At such times the Swinge is only navigable by steamers of large size and power, and even then at some risk.

Vessels from the northward and eastward, as well as those from Alderney, bound to Guernsey or Jersey, during westerly gales should endeavor to push through the Race or Swinge Channels directly the east-going stream begins to slack, the sea being then comparatively smooth, for as the west-going stream makes against the gale so does the sea rise and become dangerous, and as during the strength of this stream both the Race and Swinge Channels are covered with broken water and are then highly dangerous it is recommended at such times that vessels anchor in Alderney Harbor and there wait for a tide or for a lull in the gale.

Alderney or Aurigny Island is 3.3 miles long east and west by 1.3 miles wide at the widest part, near the western end, and has an area of 1,962 acres, of which about one-third is Crown property. The Rond But, near the southern side, is about 288 feet above high water, and is the highest part of the island, though the hill ¼ mile westward of it is nearly the same height, and at the old Telegraph Tower the land is only 10 feet lower. Alderney may be seen in clear weather from a distance of 22 miles. Its eastern extreme bears 271° 8 miles from Cape de la Hague Lighthouse and 88° 8.5 miles from the Casquets. The appearance of the island from a distance is wild and gloomy, nor does it improve on a nearer view. The southern and western coasts are high precipitous cliffs, intersected by narrow valleys and fronted by outlying rocks, among which the most conspicuous are the Coque Lihou and Noire Putes groups to the southward and the Etacs and Clonques to the westward. The latter are crowned by a fort, which commands the Swinge Channel.

The northern and eastern sides are not nearly so high, and the coast consists of a series of bays of sand and gravel separated from each other by steep, projecting points; but, with the exception of Plate Saline Bay, the intervals of beach are inaccessible on account of outlying rocks. The heights along the southern and western coasts are covered with heath and furze, but the interior is generally cultivated and fertile. There are but few trees on the island, and these only in the valleys near the town, where the neighboring hills afford some shelter.

St. Anne, the town of Alderney, is near the middle of the island. It is well built, paved, and lighted with gas. It has several chapels and the handsome parish church of St. Anne's, the whole island forming one parish under the patronage of the Crown. During the progress of the breakwater and forts villages sprang up at Craby, Braye, and Mannez, for the convenience of those engaged on the works.

Alderney has no dock accommodation nor any facilities for the repairs of shipping or for coaling steamers. The island abounds with springs of excellent water. Fuel is imported from England and cattle for slaughter from Cherbourg. These necessaries are nevertheless to be obtained almost at the same prices as at Guernsey, owing to the regular steam communication now existing between Alderney, Cherbourg, and Guernsey.

Until the building of the breakwater Alderney possessed but two small insecure harbors, both of which dry at low water neaps, viz, Longy Bay or Baie du Catel, on the southeastern side of the island, and the old artificial harbor of Braye on the northern side.

Alderney forms part of the Bailiwick of Guernsey, and is included in the military command of the lieutenant governor of that island. The civil government, or States, consists of a judge appointed by the Crown, 6 jurats, and 12 douzeniers, who are elected by the inhabitants. The population is about 2,000.

The island is in telegraphic communication with Jersey by cable from its southwestern end, and thus with England and France. Two beacons, each surmounted by a diamond and painted red and white in horizontal bands, mark the landing place of the cables near the southwest extreme of the island.

The ordinary garrison consists of a battery of Royal Artillery, besides the island militia, who are organized as artillery and reported to be very efficient. The forts along the northern, eastern, and southeastern shores of Alderney form a great feature in the appearance of the island on those sides; of them, Fort Albert is the most conspicuous, standing on the crown of a remarkable conical hill which rises from the comparatively low land at the northeastern part of the island.

The approach to Alderney on every side but from the northeastward is dangerous from the numerous outlying rocks, and the dangers of the navigation are greatly intensified by the strength of the tidal streams; therefore a stranger should close with the island only on its northeastern side, from which direction Alderney Harbor may be approached and entered by attending carefully to the directions given.

Alderney Harbor, on the northern shore of Alderney, as originally formed by the breakwater, inclosed the old harbor of Braye, as well as the anchorage in the road fronting it, and also the harbor of Craby, which latter was built chiefly to shelter the vessels employed in the construction of the breakwater and other Government works. The rocks encumbering the harbor were removed to clear the anchorage, but on account of the rocky nature of the bottom vessels using their own anchors should ride with a good scope of chain when there is much wind. The value of the harbor as a refuge is much impaired by the partial destruction of the breakwater which has taken place, and it can not in its present condition be considered as affording safe anchorage to large vessels or even those of moderate size in all weathers.

The breakwater was commenced in 1847 and completed in 1870; as constructed, it extended from Grosnez Point straight for 1,000 yards about 51°, when it curved northward for 173 yards, with a radius of 500 yards, and from thence straight to the end 35° for a further distance of 436 yards. It was built on an artificial bank of rubble stone, the main part being 40 feet wide and 6 feet above high water, springs. Unfortunately, its strength proved unequal to the requirements of the position, and its partial destruction commenced during a violent gale from the eastward on the night of January 8, 1879; went on, until by May, 1887, the whole of the outer part for an extent of 642 yards had disappeared, leaving the inner part standing for a distance of 967 yards from Fort Grosnez. The present visible end above water has been faced up and repaired and terminates so abruptly as to be easily mistaken by a stranger, unaware of the destruction that has taken place, for the former finished end, and thus might prove a great danger should the clearing marks not be made out or be carelessly disregarded. The submerged portion of the former breakwater forms a reef with a general depth at low water of from 8 to 12 feet, but with many isolated heads of from only 2 to 6 feet.

At the inner end of the breakwater there is a slipway for boats and small vessels with steps at the lower end descending to the level of low water, springs; there is also a flight of landing steps on the inner side 930 yards from the shore, and therefore close to its present outer end. The inner side of the breakwater is provided at short intervals with iron ladders from low water to the quay level. A conspicuous white bollard on the middle part of the breakwater is useful for anchor bearings.

A pier has been built from the northeast point of Braye about 160 yards long and the harbor westward of it dredged. There is a depth of 22 feet at the outer end at low water diminishing to 7 feet at the southern end of the outer arm of the pier.

Two shifting steam cranes are attached to the Admiralty works, one of 5 tons and the other of 12 tons lifting capacity. The breakwater is under Admiralty jurisdiction.

Depths.—As before remarked, the rocks inside the breakwater were for the most part removed by blasting; of these, the Tetes Champignons 288° 150 yards from Roselle Point have 16 feet water over them. Another group 234° 400 yards from Roselle Point are covered with 12 feet, and at the position of a former half-tide rock there is now a depth of 22 feet.

The Aiguillons Rocks are eastward of those removed by blasting. They consist of a group of eight heads which dry at low water; the Great Aiguillon, the easternmost rock, is 12°, nearly 300 yards from Bibette Head. The Small Aiguillon is the outermost of the group and bears west about 90 yards from the Great Aiguillon.

A dangerous reef of sunken rocks, with from 16 to 6 feet water, extends nearly 150 yards northward and eastward of the Great Aiguillon; it may be cleared on the western side by keeping the flagstaff in Fort Albert open westward of the Small Aiguillon when that rock is uncovered; and the same rock in line with the Outer Grois Rock 57° leads clear of a 12-foot rock off Bibette Head.

Lights.—Two fixed red lights are exhibited at the head of the harbor to mark the fairway channel by night; the lower light is visible at the distance of 5 miles but is obscured in the direction of all dangers and can be seen only on a line through the middle of the fairway; this light is shown from a small white square tower on the parapet of the old pier at Braye and is elevated 25 feet above high water, springs.

The upper light, visible from a distance of 9 miles, exhibited from a hut near the telegraph station, is situated 370 yards 215° from the lower light at an elevation of 55 feet above high water. This light is obscured by houses when bearing south of 207°.

Caution.—Alderney is used as a port for transferring dynamite from one ship to another, and very frequently a steamer lies there at night with a red light at her foremast head. There is some danger of such light being mistaken for one of the red leading lights, and caution in regard thereto is necessary.

Pilots.—There are six licensed pilots under the authority of the States of Alderney, who cruise about the islands, generally in a small steam vessel, displaying the usual signals. Pilotage is compulsory for all vessels above 50 tons burden except vessels of war.

Water may be obtained at Braye from hydrants, at a cost of 1s. per ton.

Coal.—There is only a small quantity of coal kept at Alderney.

Communication.—There is communication by steamer three times a week in summer, and twice a week in winter with Guernsey, and weekly with Cherbourg.

Tides.—It is high water, full and change, in Alderney Harbor at 6h. 46m.; mean springs rise 17¼ feet; neaps, 12¾ feet; neaps range, 8 feet.

Braye Harbor, within Alderney Harbor, is formed by a sheltering pier projecting in an easterly direction from the western side of Braye Bay; it dries at low water neaps and is very inferior to the little harbor of Craby.

The best time to enter Braye Harbor is on a rising tide between half flood and high water; at low water ordinary springs there is a depth of from 6 to 8 feet water between the iron beacons placed one on either side of the entrance on the two rocky masses just outside the pierhead. The western beacon has a circular eye on the top; the eastern one a cross. No leading mark is required, but the pierhead should be rounded as closely as possible.

Craby Harbor, also within Alderney Harbor, was constructed by the Government in 1850 in the creek between Braye Harbor and Grosnez Point. In addition to the shelter of the breakwater, this harbor is protected by two small piers having an entrance between the pierheads 40 feet wide, open to the northeast. This harbor is 100 yards long from west to east and 90 yards wide, and affords frontage sufficient to berth four colliers of about 150 tons burden; it dries out to the pierheads at low water springs, and at half tide there is a depth of 9 feet between the pierheads.

Regulations.—Vessels and other craft are allowed to berth in the harbor subject to certain conditions, particulars of which may be obtained from the admiralty foreman in charge of works. The master or agent of all vessels is required to sign a declaration agreeing to the five following conditions before, or as soon after as possible, using the harbor:

1. The admiralty will not be responsible for any damage of any nature or due to any cause that may happen to the vessel, her officers, crew, or cargo while in the harbor or on admiralty property.

2. Vessels, if drawing not more than 14 feet of water, can come alongside the harbor wharf at spring tides, and are left dry at low water. The bottom of the harbor consists of rock covered with mud to a depth of from 6 to 12 inches, and unless care is exercised to ground vessels on a level bottom there is some risk of damage. The berthing is considered unsuited for vessels with flat bottoms.

3. No rubbish, ashes, or refuse of any kind is to be thrown or discharged into the harbor.

4. The vessel must be removed from the harbor within 24 hours of receiving instructions to that effect from the admiralty foreman in charge of works, or in default may be removed by admiralty employees at the cost of the owners of the vessel.

5. Any damage that may be caused to admiralty property by the presence of the vessel in the harbor, or by any operations incidental to the discharge or receipt of cargo, shall be made good by the admiralty at the cost of the owners of the vessel, provided that notice of the damage is delivered to the officer in charge of the vessel or to the owner or his agent within one week of the damage having been caused.

Directions.—From the northeastward, in hazy weather it is prudent to obtain a bearing of Cape de la Hague, when a vessel may stand boldly for the northeastern end of the island; but to avoid the outlying rocks, should the weather be so thick that land can not be discerned at the distance of 2 miles, neither the cape nor the island should be approached within that distance.

When nearing either the cape or the island, the tides must be carefully considered, especially during the southwestern stream, as it sets strongly over the Blanchard and Brinchetaie Ledge; and it may be useful to note that on nearing the eastern end of Alderney the Great Coque Lihou Rock, open southeastward of the island, keeps a vessel in the stream of the Race, and the Casquets Light, open northward of Burhou Island, keeps her in the Swinge or Channel Stream. See also directions for approaching the harbor entrance when coming from the southwestward round the eastern end of the island.

In clear weather a vessel may stand direct for the island. The leading mark into Alderney Harbor can then be seen when 5 or 6 miles distant; it is the tower of St. Anne's Church, in line with the pierhead of Braye Harbor 210°, and to clear the outer end of the submerged portion of the breakwater vessels from the northward or westward rounding the breakwater must be careful to keep the beacon, black with white central band and triangular topmark, westward of King's Battery, well open eastward of the Homet des Pies Beacon, surmounted by open ironwork cage 141° or more southerly, until the leading mark for the harbor comes on.

Caution.—It is necessary to repeat, and the special attention of the mariner is drawn to the fact, that the present visible end of the breakwater terminates so abruptly as to resemble the original finished end. Vessels unaware of the destruction of the outer end of the breakwater, and rounding it without paying strict attention to the marks and directions given, run the risk of almost certain destruction on the submerged portion, which extends 642 yards beyond the present visible end. The strength of the west-going stream, especially at springs, also sets directly on the submerged end for about 9 hours out of 12, which is an additional reason for the closest attention being given to the leading marks. It need scarcely be added that a vessel should be always ready for anchoring promptly in case of necessity.

When the eastern stream is running, the submerged end of the breakwater may be safely passed by keeping the beacon westward of King's Battery in line with the beacon on Homet des Pies.

By night, on account of the strength of the tides in this neighborhood, no vessel should enter Alderney Harbor unless in charge of a pilot or of some person with good local knowledge. The leading mark is the harbor red lights in line bearing 215°; run in on this line, making careful allowance for the set of the tidal stream across the entrance. From the northward and westward do not bring the Casquets Light northward of west until the harbor lights are in line, and on approaching the harbor be very particular to have them exactly in line before shutting in the Casquets Light with Burhou Island, when a vessel will be close up to the submerged end of the breakwater. Near high or low water springs the stream sets across the entrance of the harbor with great velocity, and great caution is then necessary in entering. To insure avoiding the rocky patches outside the Aiguillions on the one side and the toe of the breakwater on the other, the bearing of the upper light should on no account be altered more than a quarter of a point on either side of the leading line 215°, and the lower light must never be lost sight of.

Anchorage may be found in a depth of about 5 fathoms, with the high light open northward of the low one.

Dangers northwest and north of Alderney.—The outer dangers along this shore have been included in the description of the Swinge Channel; those nearer the shore are the following:

The Etacs, the most remarkable of all the rocks near the western end of the island, with their off-lying shoals, from the southern boundary of the Swinge Channel. They consist of a group of four; the highest is 128 feet above high water; the center of the group is 400 yards from the shore off the western end of Alderney.

The Boues des Etacs extend 276° 350 yards from the outer Etac; their northwestern head is covered by only 1 foot at low water. The eastern end of the outer Noire Pute in line with the western end of the Coupe leads 100 yards westward of them, and the northern or low part of Tourgis Fort on with the southern part of Clonque Fort leads the same distance northward.

The Clonques are three high rocks attached to the western shore of Alderney by a rocky ridge uncovered at low water; on this there has been constructed a roadway to communicate with Clonque Fort, which fort stands on the two rocks nearest the land.

Platte Boue, Founais, and Ozard Rock, are off the Clonques on about a 246° line of bearing from the fort; the Platte Boue is close to the main reef; the Founais, which dries 6 feet, nearly 600 yards from the fort; and Ozard Rock, on which there is a depth of 4 feet, nearly 800 yards from it. Ozard Rock is very small; from it the western end of the highest Noire Pute just open eastward and clear of the inner rock of the Etacs bears 153°; and Tourgis Beacon is in line with the northern tangent of Clonque Fort.

Querouelles Rocks.—The outer edge of this reef bears 313° nearly 500 yards from Clonque Fort, and is 300 yards southward of the Barsier Reef, already described, with from 4 to 8 fathoms water between them. The Querouelles dry 8 feet at low water springs.

Caution.—There is no safe passage inside the Querouelles and Barsier Reefs, even for boats, and the first of the flood sets right on them; at this time, therefore, a wide berth should be given these dangers in passing.

The Grosse Rock, large and prominent, 14 feet above high water springs and steep-to, may be approached within 100 yards. It lies 80° 800 yards from the Corbet and north 400 yards from Tourgis Point.

The Jumelles are two small ridges of rock which uncover at half tide east 1,500 yards from the Corbet and 600 yards from the shore of Plate Saline Bay.

Braye Rocks are a group of four heads, of which the outermost seldom covers, though awash at high water springs; the three others, named the Follets, show at half tide. The outer Braye lies 29° 570 yards from the outer angle of Grosnez Fort and 200 yards from the breakwater. A rock with only 3½ feet water lies 51° 65 yards from the outer Braye.

Dangers northeast of Alderney.—The principal dangers on the northeastern side of Alderney besides the sunken rocks northeastward of the Aiguillons, included in the description of Alderney Harbor, are the Grois, the Platte, the Ledge, and the Sauquet.

Grois Ledge is an extensive and dangerous reef off Etoc Point; it extends upward of 400 yards in a 321° direction and to the distance of 500 yards between the bearings 355° and 29° from the tower of the Chateau de l'Etoc on that point, which fort should not be approached on the latter bearings within ½ mile. The Outer Grois, a peaked rock and the highest of the reef, is awash at high water springs and bears 358° 230 yards from the flagstaff of the fort. Several heads show at half tide and many more at low water. The stream rushes over this reef with great velocity. The depth is 13 feet at 250 yards 276° of the Outer Grois; and the Boues Briees, awash at low water, are 250 yards 63° of that rock. The Ortac Rock and Noir Houmet in line and well open of the breakwater 260° leads 100 yards northward of these ledges; and Bon-Ami, the high rock on the eastern side of Corblets Bay, in line with the lookout tower above the Mannez Quarries 154° leads 100 yards eastward of the Boues Briees.

Platte Rock, 108° 700 yards from the Outer Grois, uncovers 5 feet. From it the Ortac is just open northward of Etoc Point, and the summit of Bon-Ami Rock bears 198° 250 yards. The ground between the Platte and the outer extreme of the Grois Reefs is foul and should not be approached by any vessel.

The Ledge, or Fosse de la Bande, is a reef of considerable extent, with 13 feet least water. It bears 81° 1,300 yards from the Outer Grois Rock, with that rock and the Ortac in line, and the brick kilns, eastward of St. Anne, on with the northwestern tangent of Corblets Fort 220°.

The long western mark to clear the dangers off the northeastern shore of Alderney is the Casquet Towers open northward of Burhou Island 262°.

Sauquet Rock, 400 yards southward of The Ledge and 300 yards northeastward of Homeaux Florains Reef, on which is a small fort, uncovers 3 feet at low water, springs, with the tower of the Chateau de l'Etoc in line with the Ortac Rock. Great Nannel on with the Outer Grois Rock 274° leads just northward of it, and the northeastern point of Burhou Island in line with the Outer Grois leads between the Ledge and the Sauquet.

Tidal stream.—The southwestern stream running down toward Alderney divides in the vicinity of the Sauquet Rock, one part running through the Race of Alderney, the other through the Swinge; its tendency is to throw vessels near the Sauquet Rock right on it. A berth should therefore be given it of 600 or 800 yards.

Quenard Point—Light and fog signal.—From a cylindrical tower, 106 feet high, colored white with a wide black band in the center, situated 1,000 feet 266° from the flagstaff on Quenard Fort, 121 feet above high water, is exhibited a group flashing white light, visible 17 miles.

Fog signal consists of a fog siren.

Dangers east and southeast of Alderney.—The principal dangers off the eastern side of the island are the Brinchetaie Ledge, the Boufresses, and the Blanchard, and, southeastward of Port Longy, the Race and Inner Race Rocks and other rocky patches.

The Brinchetaie is a dangerous group of rocks forming a ledge extending southeastward from Houmet Herbe off the eastern point of Alderney. The outer tidal rock is 600 yards from the shore and uncovers 11 feet; the inner rock uncovers 16 feet. Several shoals, awash at low water equinoctial springs, extend 200 yards southeastward of these rocks to the distance of nearly 800 yards from the shore. Raz Island flagstaff in line with the southern extreme of Essex Castle, or the high Noire Pute, inner Coque Lihou, and southern side of the Etac de la Quoire in line bearing 240°, leads southward of the Brinchetaie, and the outer tangent of Quenard Fort on with the inner tangent of Homeaux Florains Fort leads eastward.

Boufresses Reef is nearly 800 yards westward of the Brinchetaie and closer inshore, its outer end being 350 yards eastward of Raz Island Fort; it uncovers to a considerable extent at low water. Raz

Island flagstaff in line with the middle of Essex Castle leads southward.

Blanchard Bank and Rock.—Blanchard Bank is composed of rock, gravel, granite stones, and shells. At its western extreme, which bears 80° 1,200 yards from Houmet Herbe Fort, there is a mass of rock with only 17 feet water; from thence the bank extends in the same direction to the Blanchard Rock, with only 12 feet water, which lies at the eastern edge of the bank, nearly 1,550 yards from Houmet Herbe. Between its western side and the rocks nearer the shore, off the eastern end of Alderney, there are depths of from 9 to 12 fathoms. The Blanchard is very dangerous, especially at its eastern extreme, which rises quite suddenly from depths of 20 and 25 fathoms, causing during springs eddies and a heavy sea on a weather tide.

Race and Inner Race Rocks.—Three unconnected rocky patches lie southeastward of Longy Bay, stretching off from the tails of the Brinchetaie and Blanchard at the several distances of 900 yards, 1,800 yards, and 1.3 miles from the latter. On the Race and Inner Race Rocks, the two outermost, the depth is only 18 feet, and on the patch nearest the Blanchard, which bears no special name, 4½ fathoms. From the Race Rock the old telegraph tower is thrice its own length open southward of the Etac de la Quoire and Doyles Column, Guernsey, is nearly on with the Grande Amfroque, a very distant mark, only to be distinguished in the clearest weather. From the Inner Race Rock St. Anne's mill is twice its own length open southward of the Rousset Rock, and from the northern patch the same mill is in line with the southern angle of Essex Fort.

Clearing marks.—To pass southward of the Brinchetaie, Boufresses, and Blanchard Rock, and northward of the Race and Inner Race Rocks, and of the 4½-fathoms rocky patch keep the high Noire Pute, inner Coque Lihou, and southern base of the Etac de la Quoire in line 240°. To pass northward of the Blanchard the mark is Outer Grois Rock on with the Great Nannel 274°, or, if near high water when the Outer Grois is not easily distinguished, the northeastern extreme of Chateau de l'Etoc just open northward of the Homeaux Florains. Doyles Column just open northward of the northernmost bluff land on Herm 226° leads well southward of all these rocks, as does also Cape de la Hague Lighthouse, keep bearing northward of east, or Casquets Lighthouse, in sight southward of Alderney.

South coast of Alderney—Longy Bay, or Baie du Catel, is on the southeastern side of Alderney; it has only about 12 feet in it at high water springs and dries at low water neaps; it affords but little shelter and is seldom used. The entrance is between Raz Island, on which there is a fort, and the Queslingue Rock. The distance between these points is but 350 yards, and this small space is divided into two entrances of equal width by a rock in the center, which dries 2 feet; moreover, both tidal streams set with great strength across the entrance; therefore no stranger should attempt to enter unless compelled to do so, when the following directions should be observed.

Directions.—The most favorable winds for entering Longy Bay are those between NW. by W. and SW. by S., and the best time is between 2 and 5 hours ebb; a vessel may then run aground and on the succeeding tide she may be hauled up under Essex Nunnery, on the sandy beach at the western side of the bay. The leading mark in with these winds is the nunnery just shut in by the land westward of Queslingue Rock, north, until near the rock, then, by rounding its rocky point within 100 yards, the fairway sunken rock in the entrance is avoided.

Anchorage.—Off Longy Bay, anchorage at 300 yards offshore affording shelter from northerly and northwesterly winds, may be found in a depth of 9 fathoms, sand, gravel, and shells, with the whole of Fort Albert just shut in with and seen over the western point of Longy Bay 324° and the Grande Folie rocky peak just open eastward of Raz Island Fort 21°. A better anchorage farther westward and more out of the tide is in 7 or 8 fathoms off Tchue Bay, 300 yards westward of the Rousset Rock, with the western side of Raz Fort touching the eastern side of Queslingue Rock.

The Roque Pendante is a remarkable overhanging rock on the summit of the bluff within the Rousset Rock and southwestward of Essex Castle; it may be seen from a distance of 9 or 10 miles on an easterly or westerly bearing, but on altering the bearing on either side it soon shuts in with the land and can only be distinguished from a very short distance.

Queslingue and Rousset Rocks are high and peaked; they are within 400 yards east and west of each other and close to the shore.

Essex Hill—Radio station.—On Essex Hill, within the Roque Pendante and westward of Essex Castle, a radio station has been established.

A signal station is established here for the exchange of signals by night and by day.

The Etac de la Quoire is about 100 yards offshore, near the middle of the southern coast of the island, and is connected with it at low water. It is a conical rock, about 60 yards in diameter and 106 feet above high water, or 10 feet lower than the Great Coque Lihou.

Bonit Rock bears 179° 800 yards from the Etac de la Quoire. This dangerous rock is of small extent and uncovers only 2 feet at low-water springs, having from 10 to 14 fathoms close-to. The marks for it are the Grande Folie, seen between the Rousset and Queslingue Rocks 35°, and the Etac de la Quoire, in line with a white stone beacon on the adjoining shore 357°, the latter mark leading rather on the eastern side of the rock. The Bonit may be avoided by not approaching Alderney nearer than a mile, by keeping the Casquets in sight southward of the island, or by keeping the inner Noire Pute open southward of the outer Coque Lihou.

Noire Roque, which is 15 feet above high water, bears 300° 700 yards from the Bonit and is 400 yards from the nearest shore. It is exactly in line between the Etac de la Quoire and the Great Coque Lihou. It is steep-to all around, but has a 4-foot patch only 200 yards distant northeastward between it and the land.

Alderney South Banks extend from the Bonit Rock in a southwesterly direction nearly 1.8 miles. The general depth on the main bank is 15 fathoms, gravel, from which as a base there arise seven small sand banks, one with as little as 6 fathoms water. These small banks have sharp ridges, which lie in a northeast by north and southwest by south direction. The largest is only 400 yards in length. The shallow spots commence 1,100 yards 192° from the Bonit. A vessel from the eastward may pass inside them by keeping the Coupe Rock a little open southward of the outer Coque Lihou until the Grande Folie opens westward of Queslingue Rock, and outside them from the westward by keeping the Verte-tete Rock open westward of the outer Noire Pute 324° until Grande Folie is in line with Raz Island Fort 22°.

By night Casquets Light, bearing 302°, leads ½ mile southwestward of the Pierre au Vraic and nearly 1 mile clear of Alderney South Banks. Cape de la Hague Light, kept bearing northward of 71°, also leads southward of these banks, and as some of the heaviest overfalls in the Race are caused by them they must be carefully avoided in bad weather.

The sextant angle, Casquet 90° Quenard, clears all the adjacent banks and rocks to the southward and southwestward of Alderney.

Coque Lihou Rocks are off the southwestern end of Alderney, nearly a mile westward of the Etac de la Quoire and 500 yards from the shore. They consist of a group of three. The Great Coque Lihou, the middle and easternmost, is much larger and higher than either of the others, being 116 feet above high water. It bears 133° 1,200 yards from Alderney old telegraph tower. A bank of sand, extending 550 yards eastward from the Great Coque Lihou, has on it as little as 1½ fathoms. It makes a convenient anchorage for fishing boats and small craft in fine weather.

There is a 3-fathom channel inside the Coque Lihou Rocks close to the Alderney shore. It is only 200 yards wide, and therefore not to be attempted by a stranger. Rocks awash at low water extend from the Coque Lihou Rocks more than halfway across to the Alderney shore, and a continuous sunken chain unites them to the Joyeux

Rocks, a scattered group extending 276° about ½ mile from the Coque Lihou Rocks and northeastward from the Noires Putes.

The Noires Putes are a group of rocks, four in number, three of which are always uncovered. The two outer rocks are much larger and higher than the others. These lie east and west from each other and are rather more than 200 yards apart. The western rock is flat-topped and 55 feet above high water; the eastern rock has a peak near its eastern end 76 feet high. It bears 195° 1,450 yards from the old telegraph tower. The inner Noire Pute, that always shows, is 24 feet above high water. The group is quite steep-to on the outside.

The Aiguillons, Coupe, and Orbouee, three rocks respectively 18, 22, and 6 feet above high water, lie between the Noires Putes and the Etacs, in a 230° direction from each other, the outer rock ½ mile distant from the southwestern extreme of Alderney. They form the southern boundary of the Fossee Malieres or West Bay anchorage. The Coupe, the middle of the three, is sometimes called the Cocked Hat, which it somewhat resembles in appearance. It is one of the marks for the Pierre au Vraic. The Orbouee, the outer rock of the group, is awash at high water, equinoctial spring tides; it is connected with the Coupe under water, is steep-to on the southern and western sides, but has a rock with only 2 fathoms water 200 yards 210° from it.

Orbouee Bank, extending 175° about 1,200 yards from the Orbouee Rock, consists of gravel, sand, and broken shells. Its general depths are from 6 to 9 fathoms, but toward its outer end there is an area with only 3¾ fathoms. This part rises from the main bank in a narrow ridge of fine sand about 200 yards in length, very difficult to pick up, and thrown up apparently by the turning of the stream. From the shoalest spot the Great Nannel is a little open westward of the outer rock of the Etacs, and the Etac de la Quoire is in line with the northern part of the outer Noire Pute. The bank may be cleared by keeping the Pierre de But open westward of the Etacs 1° until the Etac de la Quoire opens southeastward of the Noire Putes.

Anchorage—West Bay.—The best anchorage at the western end of Alderney is in the Fossee Malieres or West Bay, in a depth of 9 or 10 fathoms, gravel, with the Great Nannel or with the Refuge on Burhou Island touching the outer end of the western Etac, and Great Coque Lihou open clear inside the Aiguillons 96°, or the highest Noire Pute appearing midway between the Coupe and the Aiguillons. Here a vessel will lie out of the tide. There is also indifferent anchorage 400 or 600 yards 186° from the Orbouee Rock in 7 fathoms, but it is exposed to the full strength of the flood stream.

Tidal streams.—The tidal streams around Alderney are subject to changes and variations very similar in character to those around

Guernsey and Jersey, but with local peculiarities, arising principally from the more prominent position of Alderney on the edge of the true Channel Stream, and also, in a great degree, from the different form of the island itself as compared with the others.

At Alderney, as well as around Guernsey, the direction of the tidal stream revolves from east around by north to west and south, running from every point of the compass during one whole tide of ebb and flood. As at Guernsey, the stream attains its greatest strength about high or low water by the shore, but, as might be expected from the situation of Alderney, its direction at this time is difficult, coinciding more nearly with the channel stream. Thus the strength of the stream, flood and ebb, on the northern side of Alderney and the Casquets, runs about 68° and 248°, while around the Guernsey group, at the same time, its general direction is about 96° and 276°.

This change in direction may be considered as taking place on a line passing close northward of the Casquets, past the Nannels, northward of Alderney and of Cape de la Hague. A glance at the chart best illustrates how the east-going stream, after passing through the Race, Swinge, and Ortac Channels, is deflected a little to the southward of east in uniting with the channel flood stream; also how, on the west-going stream, the channel ebb stream running in a westerly direction past Cape de la Hague, Alderney, and the Casquets, is deflected through the channels between these places in a more southerly direction. This description, however, only applies to the periods of high and low water, in its transition from one to the other direction, peculiarities occur requiring a more particular description.

The eastern stream begins to make through the Race and Swinge Channels at about the time of half flood by the shore, and it attains its greatest strength, 7 to 8 knots, about the time of high water. An hour after high water the stream, in the course of its rotatory change of direction, is setting about 40° and begins to abate in strength, still veering in direction and slacking in strength; at 3 hours after high water it sets faintly 300°, causing a short slack in the Swinge, and also on the northwestern side of Burhou, after which the western stream comes down and rushes through these channels with a velocity nearly as great as the eastern stream. After low water by the shore, the stream begins to veer to the southward and abate in strength; an hour and a half after low water the stream is setting from the northward on Alderney and Burhou, causing extensive slacks or eddies southward of these islands; and, near half flood, the offing stream, now very weak, sets southeastward, causing a dead slack for a short time in all the channels between Alderney and the Casquets, followed by the commencement of the eastern stream.

Having thus described the general course of the main tidal stream around Alderney it is necessary to describe some of the most important eddies caused by the peculiar turning of the streams and the obstruction offered by islands and rocks.

Alderney, the Casquets, and intermediate rocks, all narrow in proportion to their length and each lying on a line of direction nearly east by north and west by south, are in the line of both tidal streams when at their strength; therefore at these times the resistance they offer to the free course of the stream is small and the eddies under them insignificant, but as the stream in its rotatory change of direction moves out of this line extensive eddies or inshore streams are formed under the lee of Alderney, alternately on its northern and southern shores.

On the northern shore of Alderney the inshore eddy stream commences at the Sauquet Rock and extends westward as far as the Corbet Rock, and within that rock southward of the main channel of the Swinge as far as the western end of the island, running 9 hours westward and only 3 hours eastward, the western stream commencing an hour before high water and the eastern stream at 2 hours flood. Along the southern side of the island, between Orbouee Rock and Raz Island, there are 9 hours of eastern and but 3 hours of western inshore eddy stream; the eastern stream commences 1 hour before low water and runs along the land toward Longy and beyond it during the whole flood and until 2 hours ebb. In the neighborhood of Longy, meeting with the southwestern stream of the Race, it suddenly veers and unites with it; the western inshore eddy stream commences at 2 hours ebb and sets toward the Orbouee for 3 hours, or until 5 hours ebb, at which time it joins the southwestern stream from the Swinge.

The general courses and action of these two great eddies or inshore streams are exactly the reverse of each other. They may be easily understood by reference to a chart of Alderney and by careful perusal of the foregoing remarks, but as the northern eddy sets across the entrance of Alderney Harbor at times with great velocity, and then constitutes the principal danger in entering that harbor, a more particular description of its action will now be given.

Alderney Harbor entrance.—The direction of the eastern stream half an hour before high water, about which time it attains its greatest strength, is about east; this being the line of direction of Alderney, it runs full on the western point of the island by which the stream is now fairly divided, one part rushing through the Race along the southern side of the island between 7 and 8 knots, the other through the Swinge at about the same rate, leaving a small eddy previously noticed under the eastern end of the island near the Sauquet Rock.

At high water by the shore, the turning of the offing stream from an easterly to a northerly direction relieves the pressure of the Swinge stream from the end of the breakwater, and at this time during a spring tide, the Swinge stream is running eastward at the rate of 3 knots 120 yards outside the breakwater, the intermediate space being occupied by the stream setting westward round the breakwater, also at the rate of 3 knots. This latter is the inshore stream or eddy; it commences in the eddy near the Sauquet Rock and begins to set westward, as before stated, an hour before high water. At this time the western stream sets around the end of the breakwater, in volume a mere thread, but it gradually increases in magnitude as the turning of the offing stream removes the pressure of the Swinge stream from the breakwater.

The most dangerous time in dealing with this stream and eddy is at about high water when they set past each other, separated by only a few feet, at the rate just given; great caution must therefore be used in taking a long vessel into harbor at this time. The breakwater obstructing the course of the western stream is the cause of the danger, and the stream is, of course, strongest near the outer end of that structure; therefore at high water it is advisable to enter the harbor a little southward of the mid-channel course rather than risk a too near approach to the breakwater end. An hour after high water the inner edge of the east-going Swinge stream is removed to the distance of 400 yards from the breakwater end, and both streams beginning to abate in strength the danger gradually disappears.

The destruction of the outer end of the breakwater in some degree modifies the conditions affecting this stream and eddy. To the mariner it should give rise to additional caution, in order to avoid being caught by the eddy on the port bow and set on to the submerged portion of the breakwater.

At 2 hours ebb the Swinge stream now slacking fast and veering westward sets on the Nannels; the western stream running past the end of the breakwater at the rate of 3 knots, meeting the eastern stream in the Swinge a little outside the Corbet Rock, unites with it, and both set toward the Nannels. Within the Corbet Rock, the western stream sets down inshore as far as the western end of the island.

At half ebb by the shore, the offing stream is setting faintly northwestward and there is slack water in the Swinge, but only for a few minutes, after which the westerly stream makes through the Swinge and immediately commences to run past the breakwater end with renewed strength until low water by the shore, gradually slacking as the offing stream veers from 248° to the southward. While the direction of the stream is veering through the latter section of its course there is slack water at the entrance of Alderney Harbor; after a short interval, at two hours after low water, the stream sets across the end of the breakwater in a 96° direction.

Banc de la Schole, 7 miles 286° from Alderney, lies nearly in the direct line between the Great Russel Channel and the Race of Alderney. Like most other banks between the Channel Islands it consists of a mixture of fine gravel, sand, and shells; it is very steep-to on the southern and western sides but shoals gradually on the northeastern side.

Within the 5-fathoms line it is 1.5 miles long 355° and 175° and about 600 yards wide near the middle, tapering off to a mere ridge at the ends; the 10-fathoms curve includes a space 2.3 miles in length 6° and 186° and 1,600 yards in width. The top of the bank is very narrow and consists of small semicircular ridges of sand convex to the 209°, over which the general depth is 3 fathoms at the lowest spring tides; near the middle of the bank, however, as little as 2 fathoms has been found with some spots close by of 2½ fathoms.

The soundings taken on this bank at different times tend to show that its higher parts are continually varying in depth; it is probable, therefore, that within a limited space, it also shifts its position under the influence of tide, weather, etc. The position of the shoalest spot on the bank did not alter perceptibly, however, from 1861 to 1869; the marks for it are: St. Martins Point, Guernsey, appearing midway between the Grande Fauconniere Rock and the southwestern end of Herm Island, bearing 231°; Alderney old telegraph tower 1° 7¾ miles; Casquets Lighthouse 327° 10.5 miles; and Serk windmill 212° 10 miles.

Clearing marks.—Doyles column, Guernsey, in line with the Grande Fauconniere Rock 239°, the Etac de Serk open eastward of the Burons, or Cape de la Hague Lighthouse 40°, leads southeastward and southward of the bank. Doyles column on with or just open northward of the northernmost bluff land on Herm 226°, the Gouliot Pass open westward of Bec du Nez, Serk, or Cape de la Hague Lighthouse 63°, leads northwestward and northward; and the whole of Burhou shut in behind the Etacs and Noires Putes 333° leads along the eastern side of the bank at the distance of about 2 miles. It must, however, be borne in mind that these marks are all distant and can only be made out in fine clear weather.

Between low water and half flood it is advisable to pass eastward of the Banc de la Schole; but, between half ebb and low water, westward, because in both cases the tide favors the attempt. In bad weather, if the wind and tide are ever so obliquely opposed to each other, the sea breaks very dangerously on all parts of the bank.

The Race of Alderney is the strait between Alderney and Cape de la Hague, deriving its name from the violence of the tidal streams through the strait. Here, as in the Swinge and Ortac Channels, the stream sets southwestward at half ebb by the shore, and runs in that direction, with the variations presently given, for 6 hours, or until half flood; and the contrary is the case with the northeastern stream, for there is but little slack water in the race.

The greatest strength of the southwestern stream lasts for about 2½ hours; it begins 5 hours after high water at Alderney and ends 4½ hours before the following high water. The greatest strength of the northeastern stream continues about 2 hours; that is, from 1 hour before high water at Alderney until 1 hour after. During equinoctial springs the velocity of the southwestern stream is nearly 7 knots and of the northeastern stream nearly 8 knots; at neaps, 5½ knots. The first 2¾ hours of the southwestern stream in the race, from half ebb to low water, sets 231°, and the last 2 hours from low water to half flood, 209°, and the contrary for the first and last 3¼ hours of the northeastern stream, which between half flood and high water sets very strongly around Cape de la Hague. There are, therefore, 5½ hours southwestern and 6½ hours northeastern stream; that is, half an hour's difference between the race streams and those in the Ortac and Swinge Channels.

In boisterous weather, if the wind and stream are at all obliquely opposed, the sea breaks in all parts of the race, as if it were over small knolls or patches, which makes it difficult and often dangerous for small vessels to pass through; at such times there are heavy overfalls over all the sunken rocks and banks, all of which must, of course, be carefully avoided.

Dangers in the race.—The Race Rock, Inner Race Rock, and Blanchard have, respectively, 18, 18, and 12 feet water. There is a rocky 13-fathom bank 248° 3 miles from Cape de la Hague Lighthouse, which throws up a strong overfall, and should be avoided. The fairway of the race lies between this bank and the Race Rock; the distance between is 4 miles; the soundings in the middle portion of this, the narrowest part of the race, are regular, between 20 and 24 fathoms, and the bottom rocky throughout.

Middle Rock, or Milieu, an isolated head with 7 fathoms water, lies 136° 4.3 miles from Alderney old telegraph tower; from it Casquets Lighthouse bears 293° 10 miles and Cape de la Hague Lighthouse 60° 8.8 miles. When the tide is running strongly the position of this rock is marked by a breaker or overfall, and there is at all times a ripple over it. The clearing marks given on the preceding page for the Banc de la Schole also clear the Milieu, and it may be easily avoided by attending to the directions given for passing through the Race. Another patch of 9 fathoms lies 2 miles 198° from the Middle Rock, between it and the Banc de la Schole.

Directions.—When running through the Race of Alderney from the northward, if bound for the Deroute or Russel Channels, it is at all times best to take the fairway of the channel as described, bearing in mind that the northeastern stream between half flood and high water by the shore sets very strongly around Cape de la Hague, off which there project many sunken rocks. Vessels bound for Granville, or other ports on the French shore in the Cotentin Channel round Cape de la Hague more closely, clearing its rocks and shoals by the marks given at the pages referred to.

The direct course from the race to the Little Russel Channel is about 231° and from the Casquets about 192°. Therefore, if bound from either the Race or Casquets to the Little Russel, between low water and half flood, or between high water and half ebb, allowance must be made for the stream, which obliquely crosses the courses during these periods, and great care must be taken to avoid the Milieu or Middle Rock and the Banc de la Schole.

From the southwestward.—To pass southward of Alderney South Banks, in approaching the race from the southwestward and passing along the southern coast of Alderney, keep the Verte-tete Rock open of the Noires Putes Rocks 324° until the Grande Folie comes on with Raz Island Fort, or pass inside the banks by the marks given at page 383. After passing the Bonit Rock bring the high Noire Pute in line with the Great Coque Lihou, which mark leads midway between the Inner Race and Blanchard Rocks. When Fort Albert comes on with the Grande Folie, the high Noire Pute may be brought in line with the Etac de la Quoire and so kept until Château de l'Etoc flagstaff opens northward of the fort on Homeaux Florains, to clear the Blanchard, after which steer as required out into the channel. Or if bound for Alderney Harbor, steer north until the Outer Grois Rock is on with the Great Nannel 274° to clear the Sauquet Rock; after which steer about 310° until the Ortac Rock is in line with the southern extreme of Burhou 257°, which will be the leading mark until the marks for the harbor come on, when a vessel may haul in for the harbor by the directions already given.

By night.—Casquets Light 302° leads a mile southwestward of Alderney South Banks, and Cape de la Hague light kept bearing northward of 71° clears them on the southern side; therefore run for Cape de la Hague Light bearing about 65° until the eastern end of Alderney bears 310° to clear the Race Rock, after which steer northeastward through the race and out into the channel; or if bound for Alderney Harbor, steer 12°, and when Cape de la Hague Light bears 96°, or when the Casquets Light opens northward of Alderney, steer more northerly, according to circumstances, to bring Alderney Harbor red lights in line 215°, when proceed as directed at page 377, bearing in mind that Casquets Light in line with, or kept opening and shutting in with, the northeastern end of Burhou Island leads just 400 yards northward of the Outer Grois Rock and of the ledge.

CHAPTER IX.

CAPE DE LA HAGUE TO CAPE BARFLEUR.

A full description of Cape de la Hague and its light, with the dangers in its vicinity and directions for avoiding them, together with the Nez de Jobourg to the southward and Goury Harbor, will be found at pages 231–236. The Race of Alderney, especially as it affects vessels passing near the Alderney Shore, and bound through the Deroute or Russel Channels, is described at page 384, and as regards those bound for Granville or other ports by the Cotentin Channel, along the French Shore, at pages 236–241. Directions to be observed on approaching Cape de la Hague will now be given, and the description of the coast of France from Cape de la Hague eastward will then be resumed from where it was left in Chapter V, page 235.

Directions.—When approaching Cape de la Hague from the southwestward it should be borne in mind that the northeastern stream, between half flood and half ebb by the shore, sets very strongly around the cape. Flamanville Church tower, however, seen exactly half way between the Nez de Jobourg and Cape Flamanville 156°, until the Casquets open northward of Alderney, leads a sufficient distance westward of the cape to avoid all danger of being drawn by either stream among the rocks in its vicinity.

Vessels from the eastward, coasting along near the shore between Cherbourg and Cape de la Hague, are liable to be drawn into the Race of Alderney if they do not keep 7 or 8 miles from the land when westward of Cherbourg. The race may also be avoided by keeping 1 or 2 miles northward of the two windmills on Alderney in line, because it is nearly in that direction that the separation of the west-going channel stream takes place, one part running toward the race and the other passing northward of Alderney. In clear weather these windmills may be seen from the masthead from abreast of St. Martins Bay. If overtaken by a calm, vessels should anchor if less than 7 or 8 miles from the land. Pilots recommend a position in a depth of about 20 fathoms, a little northward or northeastward of the Mermistin Shoal, which shoal is about a mile from the shore between Omonville and Querqueville Point.

Fosse de la Hague.—The soundings around Cape de la Hague are very irregular, and the violent eddies in its vicinity during the northeastern stream are caused by the great mass of water flowing over the rugged uneven bottom toward and around the cape. At 3 miles 271° from Cape de la Hague Lighthouse commences the western part of the Fosse de la Hague, which from thence trends 64° about 7 miles, its central part curving northward away from the cape and terminating 3.5 miles from the shore on the meridian of the eastern part of St. Martins Bay. The soundings throughout the whole extent of this deep are from 40 to 58 fathoms, its extreme width is less than a mile, and the depth around it is about 30 fathoms.

The coast.—The head of the Cotentin Peninsula, of which Cape de la Hague is the northwestern and Cape Barfleur the northeastern extreme, forms the narrowest part of the English Channel until the Straits of Dover are approached, the Bill of Portland bearing 337° only 51 miles, and St. Catherines Point, Isle of Wight, 25° 56 miles from Cape de la Hague.

The coast of France, after trending almost due north from the eastern shore of the Baie de Mont St. Michel, here makes an abrupt turn eastward, Cape Barfleur bearing from Cape de la Hague 95° nearly 27 miles, the coast between the two capes receding still more to the southward, and nearly midway between them is the important naval station and arsenal of Cherbourg. The aspect of this line of the coast, viewed from the northward, is that of a moderately high and well-cultizated table-land. As the shore is neared, Cherbourg Breakwater and forts are seen, and Cape de la Hague itself then appears, low and sandy, though the land becomes high close at hand. This is also the case eastward of Cherbourg, and especially between Cape Levi and Cape Barfleur, where the shore is low and sandy, though the adjacent highlands are close at the back, thus giving a generally rocky and precipitous appearance to the coast when viewed from the offing.

Basses du Houffet and du Fliart—Buoy.—From the Houffet Rocks, about 1 mile eastward of Cape de la Hague to the western point of St. Martins Bay, the shore is bordered by irregular rocks which uncover at low water, and off it are many shallow patches. The Basse du Houffet, the farthest out, is dangerous only on account of the high sea on it occasioned by the eddies; it lies 85° 1,200 yards from the Houffet Rocks and has 5¼ fathoms water over it. The Fliart, of the Houffet Rocks and 321° 400 yards from the Herbeuses at the entrance of St. Martins Bay, dries 11 feet, and is the principal rock of those which uncover along this part of the coast. The Basse du Fliart extends 63° 600 yards from the Fliart Rock and at the outer extreme is covered by only 6 feet water, about 50 yards southeastward of which is moored a red buoy with conical top mark.

Anse de St. Martin.—This bay is 2 miles eastward of Cape de la Hague; its western point is the termination of a projecting range of hills, on the top of which stands the church of St. Germain de Vaux; its entrance is bounded on the western side by the Herbeuses Rocks and on the eastern side by the high rocks of Martiauroc and Esquina. It is open to winds from northwest by west to northeast by north, which throw in a heavy sea when they blow with any strength, but it is well sheltered from all other winds, especially those from the opposite quarters. The bay may be known by the Herbeuses Rocks, which project from the point, and by a fort commanding the approach to a tolerably good anchorage in depths of from 3 to 5 fathoms, 96° and 119° of the point, where small craft find shelter with the wind from west by north around by west to southeast by south, but where they are greatly exposed if it blows strongly from the northeastward. The tidal streams also set with great strength across the entrance, rendering it somewhat difficult of access.

Herbeuses Rocks—Buoy.—The Herbeuses are large rocks rising from 30 to 40 feet above high water, and are joined to the western point of the bay by other rocks which uncover and which extend 6° 600 yards in a direct line from that point. The ground is foul around the Herbeuses, and shoal patches with only from 1 to 3 feet water lie 29°, 96°, and 141° 300 yards from their northern extreme. A red buoy is moored on the northeastern extreme of these patches.

The western shore of the bay is precipitous and bordered by rocks which uncover at low water, but in its southwestern angle, at the entrance of the valley of St. Germain de Vaux, there is a small beach of pebbles and gravel which covers at the first half hour's flood. A similar beach forms the head of the bay, and halfway up the hill behind the beach stand the church and village of St. Martin. The eastern shore is low, but the adjoining land rises gently to the top of a spur of hills running out toward Jardeheu Point, separating the rivulet of St. Martin from that which empties itself in Omonville Harbor.

From the middle of the beach at the head of St. Martins Bay to Jardeheu Point the shore is bordered by rocks which dry; outside these are others in separate groups, of which the most remarkable are the Martiauroc and the Esquina; the former is covered only at high springs, the latter is one of the largest rocks in the bay and has two heads very near each other, one rising 30 feet above the highest tides.

Parmentiere Rock—Buoy.—Several ledges, of which some uncover, extend ½ mile northwestward of the Martiauroc, and are terminated by the Parmentiere, a rock with only 3 feet water, marked by a black buoy off its northwestern edge.

The opening into the bay is about 1,600 yards wide between the Herbeuses and the Martiauroc, but the only channel by which vessels can enter and get up to the anchorage under the fort without a pilot is only 400 yards wide, and is between the Parmentiere Rock Buoy and the Herbeuses red buoy.

Jardeheu Point is a small round hillock covered with herbage and separated from the hills inland by a narrow isthmus which covers at high tides; on its summit is a mass of large rocks, and it may be easily recognized when bearing 120° or 300°; it is surrounded by rocks and shoals which extend 1,200 yards northward. The largest and most remarkable of these rocks, the Coque, bears east 600 yards from the point and is 3 feet above high water. The Hures de la Coque, a rocky ledge, extends 6° 600 yards from the Coque, at which distance the depth is only 5½ fathoms, and it causes violent eddies, which small vessels must be careful to avoid. One of the rocks on this ledge, lying 12° 200 yards from the Coque, uncovers 10 feet; it covers near the time of half flood by the shore, and it may be useful to know that when it covers the flood or eastern stream is running 2½ or 3 miles from the shore between Omonville and Cherbourg.

Semaphore.—There is a semaphore station on Jardeheu Point.

Basse Brefort, covered by only 2½ feet at low water, lies 352° ½ mile from Jardeheu Point and the same distance 316° from the Coque. The marks for this shoal, which is dangerous to coasters, are the summit of the Esquina Rock on with a village halfway up the hill westward of Jobourg Church tower and the Coque in line with and entirely concealing the Foireuse, a large rock lying 136° from it.

Tidal streams.—The sudden change in the direction of the flood or northeastern stream after passing Cape de la Hague occasions a great eddy northeastward and eastward of that cape, which extends even beyond Omonville and runs along the coast, following a direction opposed to the flood stream in the offing, for nearly 9 hours; that is, from 2½ hours before high water by the shore all through the ebb and until a little after low water.

This eddy begins to form off the entrance of St. Martins Bay about half an hour after the northeastern stream has commenced in Alderney Race, and its strength increases with that stream; but as it runs to the northwest by west, and when near the Becchue Rock comes into almost direct opposition to the stream flowing east by north and southeast by east out of the Race, it causes a cross sea which is violent in proportion to the rate of that stream. Toward the time of high water in St. Martins Bay, or 15 minutes after high water at Goury and 15 minutes before it at Omonville, when the stream is at its greatest strength, this confused sea extends nearly 2½ miles from the shore, to the line of Jobourg Church tower on with the Herbeuses Rocks. The violence of the sea decreases as the northeastern stream slackens and ends about 15 minutes before the southwestern stream begins in the Race.

A similar cross sea takes place around Jardeheu Point from the meeting of the eddy running northwestward along the shore at Omonville with the stream of flood running east by north and east by south between the Esquina Rock and Basse Brefort. This confused sea is also violent and extends into the offing as far as the line of Jalletin guardhouse on with Cape de la Hague Lighthouse. It commences at the same time as that near the Becchue, but, the eastern stream slacking, it ends 15 or 20 minutes before high water at Omonville, and then the northwestern eddy stream runs around Jardeheu Point and extends without interruption from Omonville to the Houffet Rocks.

The Foireuse, a rock midway between the Coque Rock and Omonville Harbor, is close to the outer edge of a rocky flat which runs 400 yards off the intermediate low shore, and its rounded summit is 2 feet above the high-water level. A rocky ledge extends 500 yards eastward of the Foireuse, its highest rocks uncovering 8 feet, and its eastern extreme, on which the depth is only 4 fathoms, rises suddenly from soundings of from 17 to 20 fathoms and lies in the direction of the church tower at Digulleville 3° open southward of the church tower at Omonville 229°.

A rock covered by only 1 foot at low water, from which the steeples of Digulleville and Omonville are in line, lies about 600 yards 96° of the Foireuse Rock. Greville steeple open eastward of a painted white wall on the coast, called Mur-Balise Hotterman, bearing about south, leads eastward of this and of all other dangers surrounding Jardeheu Point.

Omonville.—This small harbor lies in a slight indentation of the coast 1 mile southeastward of Jardeheu Point and affords shelter with winds from northwest by north round by west to southeast by east, but when the rocky ledges which form the harbor are covered much sea sets in, and it should only be considered as a fine-weather anchorage to await a favorable opportunity for passing through the Race of Alderney.

The position of the harbor may be easily recognized from a distance by the village of Omonville, situated at the bottom of a valley, the slopes of which are highly cultivated; by a large fort erected on the southeastern point of the indentation; by an old semaphore, called the Vigie, on the top of the hill, at the foot of which stands the fort; and by a large mass of rock on the summit of the hill bounding the valley on the north.

Depths.—The harbor has within it about 28 feet at high-water springs and 3 feet less at neaps; it is only 400 yards long 74° and 255° and barely 200 yards wide between the rocks southward of the jetty. Here vessels anchor at low water in from 13 to 15 feet, sand. The depths increase gradually from the beach to 7 fathoms immediately outside the rocks. There is a mooring buoy here for the use of fishing craft.

Beacon.—A masonry beacon, with conical top mark, painted red, with its summit 14 feet above high-water, springs, marked Etonnard Rock, which uncovers 18 feet at low water and lies 175 yards from the pierhead in the prolonged direction of the pier. **La Valace** Rock, covered by only 2 feet water at lowest tides, lies on the south side of Omonville Harbor entrance, at 1,400 yards 158° of the Foireuse Rock.

A lifeboat and all other life-saving appliances are stationed at this port.

Directions.—When standing for Omonville Harbor with light airs from southwest or southeastward after half flood vessels should take care to close the land southeastward of the port to avoid missing the entrance on account of the eddy, described at page 394, which commences to run northwestward across the entrance about that time, and runs at the rate of 2½ knots at springs. With all winds sufficiently strong to insure stemming the stream, a vessel may run directly for the entrance, taking care, if from the westward, when rounding the rocky ledge extending from the Foireuse Rock, to have Digullville Church tower at least 6° open southward of Omonville Church tower, until which Greville Church steeple should be kept bearing about south, and open eastward of the wall on the coast (Mur-Balise Hotterman) painted white.

Tides.—It is high water in Omonville Harbor at 7h. 29m., full and change; springs rise 15¼ feet; neaps, 12¼ feet.

The Mermistin is a rocky flat lying 96° 2 miles from Omonville and a mile from the cliffs of Castel Vendon; it is about 700 yards long east by north and west by south and 500 yards wide, with a depth of 6½ fathoms, and from 10 to 15 fathoms close around it. From its eastern end Urville and Nacqueville Church towers are in line bearing 147°.

The coast from Omonville trends 108° 6 miles to Querqueville Point, at the western entrance to Cherbourg. From ½ mile southeastward of Omonville to within ¾ mile of Urville Church it is high and precipitous, intersected by deep valleys, and terminates in perpendicular cliffs of gray rock, with no remarkable object on them except the rocky peak, resembling a wall in ruins, named Castel Vendon.

Half a mile 141° from Omonville Fort a rocky ledge runs out about 500 yards from the shore, and with this exception the coast from Omonville as far as Castel Vendon is steep-to at any time of tide, the rocks bordering it not extending more than 100 yards offshore.

About ½ mile westward of Urville Church the hills take a southeasterly direction, and between their last slopes and the shore leave a low, narrow plain which terminates eastward at Querqueville Point. This low shore is bordered by a beach of sand, gravel, and rocks, which uncovers at low water and in several places extends 600 or 800 yards offshore. Outside the beach is a rocky bank with irregular depths extending nearly a mile from high-water mark.

Raz de Bannes—Beacon turret.—Raz de Bannes is the northwestern part of the rocky bank just described; it lies between the bearings 336° and 29° from Urville Church Tower, and many of its rocks uncover; the highest dries 4½ feet, and on it stands a beacon turret 10 feet above high-water springs, painted red with a black top, and an iron ball as top mark. About 300° ½ mile from the beacon turret, at the northwestern extreme of the bank, is a small shoal patch covered with only 4 or 5 feet water. The turret bears 282° 3.8 miles from the western end of Cherbourg Breakwater, and is a valuable mark for vessels approaching Cherbourg from the westward in thick weather.

Plateau de Nacqueville, off Nacqueville Point, is the northeastern extension of the same rocky ledge; and from its eastern extreme the western part of the Redoute des Couplets, on the summit of a hill southward of St. Anne's Bay, is in line with the outer wall of the circular battery of Querqueville Fort. This plateau is a danger for ships of deep draft, especially in bad weather, and toward low water when the tide causes strong ripples. A small 9-foot patch lies 800 yards from the shore, and a depth of 5¼ fathoms continues to the distance of quite a mile eastward from Nacqueville Point; from its outer edge Fort Chavagnac bears 139°, distant 1.5 miles.

To pass northward of Nacqueville Ledge keep the Hotterman white wall (near the coast northward of Gréville) open northward of Raz de Bannes Beacon turret 268°.

Anchorage.—A vessel waiting a favorable time to enter Cherbourg Road may anchor between the Plateau de Nacqueville and Querqueville Point in 7½ fathoms good holding ground of muddy sand. The best position is with the lighthouse in Fort Impérial, Ile Pelée, in line with Fort Central, on Cherbourg Breakwater, 98°, and the guardhouse at Fort Roule, a little southward of the circular battery at Querqueville Fort, 132°.

Tidal streams.—Two hundred yards northward of the Mermistin Shoal, which is at the eastern limit of the great eddy described at page 394, the eastern stream begins 3h. 45m. before high water at Cherbourg, and at first sets southward at the rate of 1 knot. From 2 to 3 hours before high water at Cherbourg it runs southeast by east, with a velocity of from 3½ to 4 knots, when its direction again changes to the southward. One hour after high water it runs south by west, but its rate does not exceed a knot, and as its strength decreases it assumes a more westerly direction and finally comes to an end about 2 hours after high water at Cherbourg.

The direction of the western stream varies only from west by south to northwest by west from the time of its commencement until 4¼ hours after high water at Cherbourg, but as its speed decreases it turns successively to all the points between northwest by west and west by south, where it ends 3h. 45m. before high water. Its greatest velocity, about 3½ knots, occurs from 4 to 5 hours after high water at Cherbourg.

At 3 or 4 miles northward of the Mermistin and of Querqueville Point the flood stream begins 3 hours before and ends about 3 hours after high water at Cherbourg. Generally speaking, at that distance from the shore, eastward of the Mermistin, and also in the middle of the English Channel, the changes of the tidal streams take place at the times of half flood and half ebb at Cherbourg, which is about equivalent to high and low water at Dover.

Querqueville Point—Breakwater.—This point, lying 11 miles 108° from Cape de la Hague, is easily distinguished by its heavy fort, lighthouse, and breakwater, which latter shelters the western entrance to Cherbourg Road; it extends about 1,270 yards 77° from the inner part of the point, passing close northward of the isolated Fort Chavagnac, leaving an opening between its foot and that of Cherbourg Breakwater about 1,100 yards wide.

Semaphore.—There is a semaphore station on the hill at Querqueville, 234° nearly 1,600 yards from Querqueville Fort Lighthouse.

A lifeboat is stationed at Querqueville Point.

Cherbourg.—Cherbourg is a seaport town, naval station, extensive arsenal, and fortress of the first class, with a population of 43,731. The town stands at the mouth of the river Divette, and has a considerable trade; its principal exports being butter, eggs, vegetables, and other provisions; the imports, coal, guano and other manures, wood, etc.

The United States is represented by a consular agent.

Coal and supplies.—Coal, usually Welsh, is always available for steamers; about 300,000 tons of coal are imported annually; the stock in hand on shore is generally from 4,000 to 5,000 tons. Vessels in the commercial port can coal alongside the quays in about 12 feet water. Smaller vessels, torpedo boats, and small gunboats can enter into the inner commercial basin and coal alongside the quays in any weather, there being room for eight or nine of such vessels on each side of the basin. Larger vessels can only coal in the road from the coal hulks or colliers, but are well sheltered in almost any weather. Supplies of all kinds are plentiful, and ordinary repairs to sailing vessels or steamers can be well executed, there being a dry dock in the commercial port.

The dry docks and other appliances of the arsenal are, of course, not under ordinary circumstances available for mercantile purposes.

There is no sailors' home at Cherbourg, but in case of sickness or accident sailors are admitted to the civil or marine hospital on the recommendation of the consul with guaranty of expenses.

Communication.—Under normal conditions, two steamers leave twice a week for Havre. Steamers run five times weekly to Southampton and once a week to Gurnsey, touching at Alderney. Transatlantic steamers also call, the Royal Mail from the West Indies fortnightly, and twice a month on the outward voyage to Brazil and La Plata. The Hamburg steamers from New York call weekly. The North German Lloyd steamers touch at Cherbourg on the homeward voyage to Bremen, and on the outward voyage to New York. The American Line from Southampton to New York touch at Cherbourg on both their outward and homeward voyages. The Western Railroad brings Paris within nine hours distance, and connects with Le Mans, Granville, St. Malo, Caen, and by branches with Brest, Havre, St. Lo, etc.

The telegraphic service is very complete from all points served by the railway, and the coast semaphore service enables messages to be rapidly forwarded to almost all parts.

A radio station is established at Cherbourg, open to the public at all times. Call letters F.F.C.

Rade de Cherbourg may be roughly described as including the whole space inclosed by the three breakwaters of Cherbourg, Querqueville, and Ile Pelee. It is sheltered on its northern side by Cherbourg Breakwater, on its western side by Querqueville Breakwater, and on its eastern side by Ile Pelee Breakwater; its southern limits are the shores of St. Anne and Cherbourg Bays. The area of the sheltered portion, not including St. Annes Bay, with 3 fathoms depth and upward, is about 1,650 acres; with 4 fathoms and upward, 1,350 acres; with 5 fathoms and upward, 900 acres. The shelter afforded by the breakwaters is excellent, and vessels now ride in safety where formerly they dared not anchor.

Breakwaters—Cherbourg Breakwater—Buoys.—This magnificent structure rises from a depth of from 6 to 7 fathoms at low water; it consists of a foundation of rubble stone deposited à pierre perdue up to the level of low water, equinoctial springs. This is 4,060 yards in length and its base about 100 yards wide, having a long foreshore to seaward and its harbor side standing at an angle of 45°. Upon this foundation is built a wall of masonry, nearly vertical, 33 feet wide at the base and decreasing to 27 feet at the top, which, with the parapet, rises 23 feet above the level of high-water springs.

The breakwater is not straight, but consists of two arms of unequal length, each diverging 5° toward the harbor, the western arm being about one-third longer than the eastern. The work was begun in the year 1784, was several times interrupted, but was brought to a successful close in 1853. The breakwater is defended by Fort Centra placed at the point where the arms diverge, by forts at each end named, respectively, Forts de l'Ouest and de l'Est, and by an intermediate battery on the western arm. A large black buoy marks the western extreme of the foundation of the breakwater and a red buoy its eastern extreme.

Querqueville Breakwater has been already described; its construction was only commenced about the year 1889, and it has closed the former deep-water entrance westward and southward of Fort Chavagnac, at the same time affording good shelter to St. Annes Bay.

Ile Pelee Breakwater, being constructed in shallow water, was a much more simple work than either of the others; it was commenced about the same time as Querqueville Breawater. It leaves the shore at Greves Point, and its direction for nearly 1,000 yards is 352°; it then curves westward during the next 400 yards, and finally runs nearly 800 yards northwest by west to its junction with Fort Imperial on Ile Pelee, its total length being about 2,200 yards. About 500 yards from Greves Point an opening about 70 yards wide is left for coasters, in which the depth is about 5 feet at low water; there are also several small openings near Fort Imperial.

Pilots.—Cherbourg pilots usually cruise between the western entrance and Point Jardeheu in open boats which can not keep the sea in bad weather; they have, however, one decked boat fit to cruise in any weather.

Pilotage is compulsory for all sailing vessels over 100 tons and for steamers over 150 tons net register. Pilotage dues can be claimed by the pilot whether his services are used or not, if once offered.

A lifeboat is stationed at the western end of Cherbourg Breakwater.

Lights.—The following lights are exhibited in the approach to Cherbourg:

Querqueville Breakwater.—From a military mast, 43 feet in height, on the outer end of Querqueville Breakwater, is exhibited a fixed light with a white and a green sector. It is elevated 59 feet above high water, and visible 11 miles the white and 6 miles the green light. The light is unwatched.

Cherbourg Breakwater—West end.—A group-flashing light is exhibited at an elevation of 62 feet above high water from a cylindrical turret, 51 feet in height, on the western side of Fort de l'Ouest, at the western end of Cherbourg Breakwater, visible 13 miles, and showing group-flashing and alternating white and red light.

Fog signal.—A fog horn, worked by compressed air, has been established at the Cherbourg Breakwater west end lighthouse.

Cherbourg Breakwater — Experimental submarine bell buoy. — A submarine bell buoy has been moored experimentally about 220 yards northward of the western end of the central breakwater.

East end.—A fixed white light with a green sector, elevated 62 feet above high water, is exhibited from a circular turret, 32 feet high, on the eastern side of Fort de l'Est, at the eastern end of Cherbourg Breakwater. In clear weather the white light is visible 13 miles; green light at 7 miles.

Fort du Homet Jetty—Light.—On the eastern extremity of jetty a light, fixed green, 32 feet above high water, visible 3 miles.

A light vessel, carrying a red ball at the masthead by day and exhibiting a fixed red light by night, is moored at a distance of 1,100 yards 206° from Fort de l'Est Lighthouse.

Ile Pelee.—An occulting white light with a red sector, visible 9 miles, is exhibited from a white circular metal tower, 29 feet in height, on the northeastern bastion of Fort Imperial on Ile Pelee, at an elevation of 67 feet above high water.

Ile Pelee Breakwater—South head.—From a lantern on the south head of the northern part of Ile Pelee Breakwater is exhibited a fixed green light, elevated 27 feet above high water and visible 6 miles. The light is unwatched.

Commercial port.—A group-flashing red light, visible 9 miles, is exhibited from a circular white stone tower, 24 feet high, on the head of the eastern jetty of the Port du Commerce, at an elevation of 33 feet above high water. Obscured to the northwestward by Fort Homet.

A fixed green light elevated 15 feet above high water, visible at 2 miles, is shown from a lamp-post at the head of the western jetty.

Fog signal.—At East Jetty Lighthouse is established a fog bell.

St. Annes Bay is upward of a mile wide between Querqueville Breakwater and the ramparts of Cherbourg; its shore, on which are several batteries, is low and almost entirely bordered by rocks which uncover at low water. Of these, the Rochefort, a large rock at the head of the bay, is about 400 yards from high-water mark and 1,200 yards 175° from Fort Chavagnac; its summit is 2 feet above the level of the highest tides.

The western part of this bay is well sheltered from all but northeasterly winds by Querqueville Breakwater, but the water is not deep, the 3-fathoms curve being about 900 yards from the shore, with only 3 feet water close to its edge at one part; so that, taking Fort Chavagnac as a center, a radius of about 700 yards from it will include all the available anchorage space, and this is now prohibited altogether as an ordinary anchorage.

Rocky ground, on which the depth is only 12 feet and less, extends 51° ½ mile from the Rochefort Rock, with the summit of that rock nearly in line with Henneville Church tower, and 296° 1,800 yards from Fort du Homet, the fort at the northeastern angle of the dockyard. The outer part of this shoal ground is much in the way of large vessels beating in or out of Cherbourg Road, and should be avoided at springs from one-third ebb to two-thirds flood, and at all times of tide during neaps.

Fort Chavagnac stands on a small rocky patch fronting St. Annes Bay, close to the outer end but inside of Querqueville Breakwater, with which it will probably be connected, and there is now no passage between them; the patch is about 150 yards long and from 50 to 60 yards wide. The southern and eastern sides are almost steep-to.

Cherbourg Bay is bounded on its western side by the Tenarde and other rocks off Fort du Homet, and on its eastern side by the Flamands Rocks, and Ile Pelee with its breakwater. The town of Cherbourg and the Port du Commerce occupy the head of the bay, and the establishments of the Arsenal or Port Militaire the western side between the town and Fort du Homet. The shore is low from the front of the town to the Flamands and is bordered by a sandy strand 500 yards wide at low water with shallow flats of less than 3 fathoms extending 600 or 800 yards farther out. The whole of the bay eastward of the Flamands and toward Ile Pelee Breakwater is very shallow.

The low land adjoining the shore of Cherbourg Bay soon rises into high hills, between which are the valleys of Roule and Tourlaville. The entrance to the Roule Valley is between two hills of unequal height southward of the bassin-a-flot, or wet dock, of the Port du Commerce. The eastern hill, Mont Roule, is steep and crowned by Fort Roule at only ¾ mile inland, which fort commands all the neighborhood. On the top of the western hill is a semaphore. Tourlaville Valley is eastward of Roule Valley and only separated from it by the range of hills, of which Mont Roule forms the northwestern extreme. The entrance to this valley is wide, but it rapidly narrows farther inland.

Tenarde Ledge — Buoy. — The Tenarde is a dangerous rocky ledge 200 yards in length 275° and 95° and 100 yards wide, with from 7 to 13 feet over it at low water, lying about 400 yards 29° from Fort du Homet. From its eastern head Nacqueville Church Tower is in line with the smallest tower of Querqueville Church, bearing 274°, and the top of the group of trees surrounding Fief Farm, ½ mile southeastward of Fort Roule, in line with the end of the western jetty of the Port du Commerce 160°. A red buoy lies in a depth of 5 fathoms about 70 yards northeastward of the eastern end of the ledge.

The small church tower at Querqueville kept exactly between the tall spire of that church and the tower of Nacqueville Church leads 50 yards northward of the dangerous parts of the Tenarde. A rocky flat, with a patch of 11 feet at its extreme, extends 68° 400 yards from the fort; between this flat and Tenarde Ledge there is a narrow channel with from 19 to 21 feet water over rocky bottom.

The Roches des Flamands are close to the southeastern shore of the bay and their highest parts uncover at low water. A strong fort erected on these rocks is approached from the shore by a causeway and drawbridge. Shoal ground, with from 6 to 18 feet water, extends 800 yards northwestward from Fort des Flamands, and northward this flat extends still farther from the shore, being separated from the eastern end of Cherbourg Breakwater by only 600 yards. Eastward of the fort and anywhere near Ile Pelee Breakwater the water is very shallow, but there is a 6-foot channel leading up to the opening in that breakwater.

Port d'Echouage.—On the eastern side of Fort des Flamands is this small harbor, chiefly used by vessels of not more than 300 tons burthen laden with timber for the use of the dockyard. A canal connects it with the Mare de Tourlaville to the eastward, where building timber is stored and which is 50 acres in extent.

The Port du Commerce consists of an Avant-port, with the channel leading to it, and a bassin-a-flot, formed by damming and excavating at the mouth of the little river Divette, which waters the Roule Valley.

The entrance to the Avant-port lies between two stone jetties parallel with each other and 60 yards apart. The western jetty is only half the length of the eastern jetty and both are marked by lights. The bottom of the channel is a mixture of sand, mud, gravel, and shingle.

It is proposed to carry out the following improvements:

Dredging the entire Avant-port, so as to obtain a depth of at least 11 feet at mean low water, springs.

Dredging the channel between the two piers and widening the channel outside the piers.

Building a new commercial dry dock.

Lengthening the quay on the eastern side of the Avant-port.

Depths.—The dredged channel through the entrance and Avant-port up to the bassin-a-flot, and also alongside the jetty for the accommodation of the Southampton steamers, has a depth of 25¾ feet at high water, springs, 21 feet at neaps, and 5 feet at low water, springs. Over the sill of the bassin-a-flot there is 1 foot less. Vessels of 15 feet draft can ground alongside the quays of the Avant-port at high water, springs, and those of 9 or 10 feet at neaps.

Avant-port.—Just within the inner end of the western pier of the Avant-port is a small slipway, with the customhouse adjoining. At 60 yards southward of this slipway a pier projects eastward from the western quay, to break the swell which sets in with strong northerly winds. The Avant-port is surrounded on three sides by granite quays and within the short pier just described is 328 yards long in a 6° and 186° direction, 212 yards wide, and dries at low water on the western side, where the bottom is of rock, but with a covering of muddy sand, affording good grounding berths to the merchant vessels, for whose use this side is appropriated. The eastern side is occupied by Government vessels and by the jetty before mentioned, built for the Southampton packets. The swell and surf, though much diminished, still sets in through the channel with heavy gales from northwest by west to northeast by north. Vessels making any stay in the port should therefore enter the bassin-a-flot as soon as possible.

The bassin-a-flot, or wet dock, is 456 yards long and 139 yards wide, having an area of 12¾ acres. It communicates with the outer harbor by a double parallel entrance, of which the eastern is the widest and deepest, being 52½ feet wide and having 23 feet water over the sill at high water, springs, a considerable portion of the basin being dredged to a slightly greater depth. The sill of the western entrance has 16½ feet water over the sill and the width is 42½ feet. Both entrances are closed by gates on pivots, which usually remain open about an hour and a half, but are shut with a falling tide. There are building slips at the head of the basin. At the northwestern corner of the Avant-port, near the customhouse, there is a dry dock, 249 feet in length over all by 46 feet in width at the entrance, and with 18 feet over the sill at high water, springs.

As vessels are not permitted to enter without pilots, and as a pilot can always board a vessel in the Little Road, it is unnecessary to give directions for entering the Port du Commerce.

Port de l'Onglet has its entrance 600 yards northwestward of the piers of the Port du Commerce, and the walls of the arsenal form its western side. It is a little inlet, with from 2 to 5 feet at low water, springs, very useful for boats and small craft, which can make fast alongside its quays at all times of tide, but its entrance, open to 29°, is sometimes dangerous with strong winds from that quarter.

The Port Militaire, or dockyard, is northwestward of the town of Cherbourg and occupies a space of about 220 acres of the level ground at the foot of the Equerdreville and Couplet Hills. It is especially appropriated for vessels of war, and is a naval dockyard of the first class; it is surrounded by fortifications, Fort du Homet being its principal defense toward the sea.

The port, properly so-called, consists of three extensive basins. The outer tidal basin, or Avant-port, of 16 acres, communicates with the roadstead by a short channel opening eastward, in which the least depth is 22 feet at low water, and, with the Basin Charles X of 15 acres, by gates 59 feet wide, having their sill 13½ feet below the level of the lowest tides. Both these basins have been excavated in the solid rock to a depth of about 32 feet below that level.

An inner basin named the Basin Napoleon III, of 20 acres in extent, was opened in August, 1858. It has seven large building slips and one dry dock on its western side, four dry docks at the northern end, and two dry docks at the southern end. There are also four building slips and a dock on the southern side of the Avant-port, making in all eleven building slips and eight docks. The quays and docks are faced with fine granite from Dielette, Flamanville, and Chausey. The space for steam factory and workshops is small in comparison with the other works.

Works are in progress constructing a new naval breakwater from the Fort du Homet to the eastward.

Docks.—There are eight Government docks at Cherbourg, the dimensions of which are:

Docks.	Length.		Breadth of entrance H. W. O. S. level.	Depth on sill high water ordinary springs.
	On blocks—Available docking length.	Over all.		
	Feet.	*Feet.*	*Feet.*	*Feet.*
No. 1	317	342	65	29½
No. 2	350	374	65	29½
No. 3	350	374	65	29½
No. 4	317	342	65	29½
No. 5	450	474	96½	36½
No. 6	606	615	65	28
No. 7	237½	265	81½	17½
No. 8	219	257½	78¾	17½

These docks, by special permission, can be used by merchant vessels that are too large for the commercial dock.

Time signal.—The time signal is shown from the lookout of Fort l'Onglet, Quay Napoleon, at 35 feet above high-water level. It is made by means of a metal disk about 3 feet in diameter; the disk is placed in a vertical position five minutes before signal time, and is dropped to a horizontal position at the instant of that time by electricity from the Naval Observatory. The time signal is made at 10h. a. m. Greenwich mean time, and is repeated at 10h. 2m. Greenwich mean time. When not in use the disk is inclined at an angle of 45°.

NOTE.—If the signals have not been made correctly the disk will again be placed vertically as soon as possible after 10h. 2m. 0s., and the signal will be repeated at 10h. 7m. 0s. if the first signal only is to be annulled; at 10h. 12m. 0s. if the second signal only is to be annulled; and at 10h. 17m. 0s. if both signals are inaccurate. These repetitions are not to be considered as signaling the exact time.

Ile Pelee—Beacon turrets.—This isle is all that remains of the long point which formerly extended nearly 1.5 miles northward from Point de Greves, but was separated from it by the action of the sea, leaving a shallow channel between it and the mainland nearly ½ mile wide, which has now been almost closed by the construction of the breakwater. The isle is a flat of bare rock, nearly covered at high water, but at low-water springs it is about ¾ mile long from north to south by ½ mile wide, and is somewhat in the form of a horseshoe concave toward the east; its highest point is a heap of stones awash at high water equinoctial springs. Fort Imperial stands on the western point of the isle; on its southwestern bastion is a flagstaff, and the occulting white and red light already described is exhibited from the northeastern bastion; both bastions are sufficiently high to be seen at a distance of 10 or 12 miles seaward. The northwestern and northeastern extremes of the isle are marked, respectively, by the Tromet and Happetout black beacon turrets.

Semaphore.—There is a semaphore station on the southeastern and highest part of Fort Impérial.

Dangers on Ile Pelee Flat.—The principal dangers which do not uncover upon the outer part of the rocky flat forming the base of Ile Pelee are the Basse de Happetout, the Roches du Nord-Ouest, and the Truite Rock.

Basse de Happetout, a small, isolated rocky patch with only 13 feet water, is at the northeastern extreme of the dangers of Ile Pelee. It lies 66° 1,850 yards from Fort Impérial Lighthouse, with the high battery of Fort du Homet just open northward of the lower battery of Fort Imperial, and the small houses adjoining the eastern part of the barrack at the Becquet de Denneville on with the houses of a farm on the height above the limestone quarries called the Becquet

Cliffs. A little westward of the Happetout is another patch with 3 fathoms water.

The rocky flat of Ile Pelee extends 400 yards in a northerly direction from the northern side of the isle, and as the sea is always disturbed upon it and the soundings vary from 9 to 23 feet, it is prudent for vessels to avoid approaching its northern edge. The spire of Querqueville Church well open northward of Fort Central leads clear of it.

Roches du Nord-Ouest—Buoy.—There is a depth of 4 fathoms on the western extreme of these rocks at low water, but 70 or 80 yards eastward of this are some rocky heads with from 13 to 11 feet only. A black buoy lies westward of the point of the shoal in about 5 fathoms, with Fort Impérial Lighthouse bearing 141° 850 yards and the Truite Buoy 184° 400 yards nearly. The flood stream sets strongly toward the point of these rocks, which becomes very dangerous when with westerly winds the stream is at its greatest strength.

The Truite Rock—Buoy.—This rock, lying at the western point of the flat on the eastern side of the Passe de l'Est or eastern channel in Cherbourg Road, is about 100 yards long, east by north and west by south, and 60 yards wide. A black buoy is moored in about 5 fathoms at 70 yards 333° from the western extreme of the shoal and 296° 600 yards from Fort Impérial Lighthouse. The shoalest spot is near the center of the rock, where there is only 3 feet water. The marks for the western end in 10 feet are the end of the eastern pier of the Port du Commerce seen a little southward of the square tower of St. Trinite Church, Cherbourg, and the barracks at Becquet open half their length southward of the outer wall of the low battery and southwestern bastion of Fort Imperial.

Caution.—Although there is much less sea in the vicinity of the Truite than off the Roches du Nord-Ouest, both buoys are liable to drift from their exposed positions, and more dependence should be placed on the landmarks given than on the buoys being in their places.

The Pelee Bank is the sand bank extending westward from Pelee Isle and Breakwater into the most sheltered part of the Grande Rade. There is 23 feet water on its western extreme 192° 600 yards from Fort Central, and its 5-fathoms limit is 400 yards farther northwestward. It forms the northern and eastern limits of the roadstead for deep ships, but there is excellent shelter for vessels of moderate draft between its 5-fathom curve and the eastern arm of Cherbourg Breakwater.

Anchorages.—The principal anchorages for ships of war and large vessels are the Grande Rade and that near the breakwater eastward of the intermediate fort and extending beyond Fort Central, and for smaller vessels the Petite Rade and the eastern part of th anchorage near the breakwater. St. Annes Bay does not afford good anchorage and is within the prohibited area.

The guardship "Imprenable" is moored broadside to the breakwater, with head to the eastward, in a position distant 460 yards 209° from Fort Central.

The Grande Rade is bounded on its northern and northeastern sides by the Pelee Bank, and its western limit is the meridian of Cherbourg Cathedral. This road is specially reserved for large men-of-war. A buoy moored for the use of ships in the adjustment of their compasses is located 600 yards southward of Fort Intermediaire.

The bottom in the northern part of the road is for the most part composed of schistose rock in a state of decomposition, and the holding ground is good; immediately southward of this rock the bottom is of fine muddy sand which is not sufficiently stiff to hold well, but it improves on nearing the shore.

Prohibited anchorages.—Outside Cherbourg Breakwater vessels may not anchor in the fairway: (*a*) Westward of a line drawn 184° through Fort de l'Ouest; (*b*) eastward of a line drawn 155° through Fort d l'Est.

In Cherbourg Road vessels may anchor within the spaces limited as under:

1. Western anchorage: (*a*) On the west by a line drawn 176° from the light on Fort de l'Ouest; (*b*) on the east by a line drawn 178° through Fort Intermediaire; (*c*) more than 200 yards from the breakwater.

2. Eastern anchorage: (*a*) On the west by a line drawn 206° through Fort de l'Est; (*b*) on the east by a line drawn 174° through Fort de l'Est; (*c*) not within 600 yards of Fort de l'Est.

There is excellent anchorage within the above circumscribed limits, in depths of from 4 to 6 fathoms, as well as within the permitted area on Ile Pelee Flat in 1½ to 2 fathoms; it is chiefly used by merchant vessels seeking shelter from northerly gales. The deepest water and best swinging room is in the western anchorage, as also the best holding ground.

All captains, masters of vessels, and others who have anchored in unauthorized places may be compelled to slip their cables after having their ends buoyed.

Disregard of these regulations subjects the offender to severe penalties.

The Petite Rade has good holding ground, and is well sheltered by Fort du Homet and the dockyard from westerly winds. It is used by gunboats and dispatch vessels and by merchant vessels waiting tide to enter the Port du Commerce. The soundings decrease rather rapidly from 3½ and 4 fathoms to 12 feet within a distance of 400 yards. Vessels entering the Port du Commerce may anchor well to the eastward, as at half flood the inshore eddy sets westward and assists their entering.

Channels into the Rade de Cherbourg.—Ships of war and vessels of deep draft enter the road by the channels around both ends of Cherbourg Breakwater, the western channel being named the Passe de l'Ouest and the eastern channel the Passe de l'Est. Owing to the existence of two detached soundings of 5 fathoms practically in mid-channel, the Passe de l'Ouest is available for the deepest ships at all times of tide except low-water springs. The Passe de l'Est is only available for such ships between half flood and half ebb.

Passe de l'Ouest.—The Passe de l'Ouest is the best channel, and is about ½ mile wide; there is no difficulty in entering by it with a leading wind, vessels having only to approach the western end of Cherbourg Breakwater on about a 141° bearing, and on nearing it to pass midway between it and Querqueville Breakwater; those of deep draft turning in with the flood stream, after passing within the breakwaters and Fort Chavagnac, must be careful to avoid the rocky ground with 12 feet water 51° ¼ mile from the Rochefort Rock, and also the Tenarde Shoal; it is imprudent to turn through at night unless the weather is clear and moonlight.

Shoals.—Three shoal heads exist in this channel, one having a depth of 29¾ feet over it, is situated at a distance of about 500 yards 63° from the head of Querqueville Breakwater; another, with a depth of 27 feet over it, is situated at a distance of about 150 yards 17° from the head of Querqueville Breakwater; and the third, having a depth of 29 feet over it, is situated at a distance of about 240 yards 62° from the same place.

Passe de l'Est is between the eastern end of Cherbourg Breakwater and the two black buoys before described, marking the most dangerous spots on the western edge of Ile Pelee Flat, viz, the Roches du Nord-Ouest and the Truite Rock. The narrowest part of the channel is 470 yards wide between the breakwater and Truite buoys, and has in it from 24 to 32 feet, the deepest water being close to the breakwater buoy; but, besides being narrow, this channel has the disadvantage of being crossed obliquely by the tidal streams, rendering it dangerous for sailing vessels with light winds and impracticable during calms; there is, however, no difficulty or danger in a steamer or with a commanding breeze.

Vessels from the eastward intending to run through this channel on the flood should be careful to give a good berth to the Roches du

Nord-Ouest, keeping rather westward of the exact line of the channel until the point of that shoal is passed, as the flood stream sets strongly toward it. Octeville Church just open eastward of Fort de l'Est 212° leads clear of it, should the buoy be gone; and on closing the fort alter course so as to pass between the Truite black buoy and the red buoy off the eastern end of the breakwater.

The shallow entrance channel from the eastward through the opening in Ile Pelee Breakwater has a west and east direction and carries only from 5 to 7 feet in the best water for at least 1,400 yards; it is therefore fit only for coasters or for the smallest class of gunboats, torpedo boats, etc. When within the breakwater the narrow channel is bounded on the north by the Basse du Chenal, which is almost awash at the lowest tides.

Measured distance.—A measured distance for speed trials, with a total length of 15,538 feet, is marked off outside Cherbourg Breakwater, its line of direction being Tromet Beacon Tower (black) in line with a large beacon formed of a white mast with black ball on Pelee Island, 65 yards southwestward of Happetout Tower, bearing 97°. The eastern limit of this distance is defined by a mast and ball beacon eastward of Fort Central, being on with the northwest angle of Fort du Roule; its western limit is marked by the transit of two beacons (mast with ball) on Querqueville Fort.

Two beacons placed close eastward of Fort du l'Ouest in line divides the total measured distance into two portions, either of which can be used separately for speed trials if required; the eastern part, over a depth of 8 to 9 fathoms at low water, is 7,582 feet in length; and the western, with 7 to 8 fathoms, 7,956 feet.

A measured distance, 6,168 feet in length, is also marked off on the inner side of the breakwater by beacons upon it, the line of which, in a depth of 5 to 6 fathoms, is with the northern extreme of Fort Imperial in line with a beacon (mast and ball) on the small pier westward of Fort de l'Est, bearing 92°.

Tides.—It is high water, full and change, at Cherbourg at 8h. 0m.; ordniary springs rise 20¾ feet and neaps 16 feet above the datum or zero of soundings (as on B. A. plan No. 2602), which is about 3 feet below the level of low water ordinary springs. Strong westerly winds in the entrance of the English Channel cause an increased rise of 1 or 2 feet even during calm weather in the vicinity of the port; easterly winds have a contrary effect. During westerly gales, at springs, the sea frequently overflows the quays of the outer harbor of the Port du Commerce. The mean duration of the rising tide is 5h. 45m. and of the ebb 6h. 35m.

Tidal streams.—The flood stream begins to be felt in the Grande Rade half an hour after low water by the shore and ceases three-fourths of an hour after high water; its direction is suotheasterly and its rate about 2 knots. The greatest speed of the northwestern or ebb stream hardly ever exceeds 1½ knots unless the wind is strong from northeast by north or east by north.

In the anchorage near Cherbourg Breakwater, the eastern stream commences about an hour after low water and ends an hour after high water. The streams are feeble throughout the whole extent of this anchorage.

The Petite Rade is in the eddy of the flood stream occasioned by the projection of Homet Point. This eddy extends beyond the northern limit of the Petite Rade, forming a counter stream which sweeps along the shore in a west by north direction from about 600 or 800 yards eastward of the entrance to the Port du Commerce to the head of the bay, and then northward along the boundary wall of the dockyard. It begins about half flood and continues until high water; its greatest rate is about 1½ knots at springs and its rate decreases toward high water, finally merging in the true ebb stream which follows the same direction, and, at half ebb, when at its greatest strength, its rate is about 2 knots.

About ½ mile northward of the Passe de l'Ouest, the flood stream, which runs southeast by south and southeast by east, commences about 1½ hours after low water by the shore and ceases 1h. 20m. after high water, its greatest speed being 3 knots. The ebb runs northwest at nearly the same rate. In the entrance the flood stream first takes a south by west direction, but, as it gains its greatest strength, which is about 2 knots at springs, it inclines toward southeast by south. The direction of the ebb varies from northwest by north to northwest by west, its rate being nearly the same as that of the flood. The flood stream ceases at the western end of the breakwater about an hour after high water.

The flood stream begins to be felt in the Passe de l'Est one hour after low water and ceases one hour after high water. Its direction is 85° between the breakwater and Truite buoys, and its greatest speed, at from 4 to 5 hours flood, is 2½ knots, but a little northward of this position the stream runs east 3½ knots. At the edge of the Roches du Nord-Ouest and along the northern edge of Ile Pelee Flats, its direction is 51° and its greatest rate 4 knots. The eddies formed by the uneven rocks on the flat produce a violent and dangerous race.

The ebb stream is subject to less variation and its rate is rather less than the flood. It runs along the northern edge of Ile Pelee and, from thence, west until the rocks are uncovered; but, outside the flat and Cherbourg Breakwater, its direction is west by north.

Directions — Cherbourg approach — Fairway reserved for traffic when submarine vessels are exercising.—A square flag with a yellow and a red horizontal stripe, hoisted at Fort du Homet and on the western end of the breakwater, indicates that submarines are exercising submerged in Cherbourg Road.

The same flag hoisted at the signal stations at Jardeheu and Cape Levi and on the breakwater at Fort Central indicates that these vessels are exercising submerged off the coast in the approach to Cherbourg.

When this flag is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the port of Cherbourg are earnestly requested to make use of the fairways, defined below, in which submarine vessels are prohibited from exercising submerged.

These fairways are limited as follows:

Passe de l'Est.—On the east, by Fort du Roule in line with Fort de l'Est 193°; on the west, by the east side of Fort Imperial, Ile Pelee, in line with the west side of Carrieres de l'Ouest 189°; on the north, by a parallel drawn 2 miles northward of the breakwater.

Passe de l'Ouest.—On the east, by the meridian of Fort de l'Ouest; on the west, by the west side of Couplets redoubt in line with the east side of Fort Chavagnac 182°; on the north, by a parallel drawn 2 miles northward of the breakwater.

Note.—In cases when it is necessary to use the fairways defined above for exercises, flag D of the international code will be hoisted below the yellow and red flag.

Remarks.—The above limits have not been placed on the chart plates.

Approaching Cherbourg from the westward.—The western end of Cherbourg Breakwater bears 112° 83 miles from Start Point, 149° 59 miles from the Bill of Portland, and 181° 59 miles from the entrance to the Needles. When bound to any French port eastward of Cape de la Hague from the westward, the best landfall to make is the coast of England, proceeding exactly as if bound for an eastern English port, as directed in British Islands Pilots, volume 1, until arrival at a proper position to haul over toward the French coast. Thus, when bound for Cherbourg, proceed by the English shore until abreast of the Start, when, having ascertained the vessel's position and the weather being clear, a course may be shaped to make the Casquets; or, bearing in mind the great strength and variety of the tidal streams in the neighborhood of the Casquets, and to avoid all danger of being carried through the Ortac, Swinge, or Race Channels, especially should the weather be at all doubtful, it may be better to make Portland and then stand across for the French coast, shaping a course about 6° westward of Cape Barfleur. The ship's position may then be accurately fixed by cross bearings of Capes de la

Hague and Barfleur by day or of their lights by night; the white side of Mont Roule is also a conspicuous object by day, being visible at a distance of 20 miles in clear weather.

Should it be determined to make the Casquets, consider carefully the direction of the wind and tidal streams as well as the state of the weather, which, unless clear, may render the approach to these islets not only difficult but dangerous. On nearing them great care must be taken to avoid being set southward of them, especially while the tide is flowing on their shores, when there would be great risk of being drawn into the Swinge Channel and being obliged to cross Alderney Race at the time the sea is most agitated.

From a position about 9 miles 300° of the Casquets the course to be steered must depend greatly upon the wind and tide. With the wind anywhere from southwest by west round by north to north by east, and making due allowance for tide, a course of about 80° for 14 miles leads 5 miles northward of all danger up to the meridian of the western point of Alderney, when Cape de la Hague Lighthouse should bear about 127° 12 miles; then a 96° course for 11 miles leads to a position from which the lighthouse, well open of the land, bears 186° 5.5 miles; and from thence a 127° course for 14 miles leads to the western entrance into Cherbourg Road.

These courses keep a vessel a safe distance outside the dangers, and also beyond the influence of the strong tidal streams running through the Ortac and Swinge Channels and Alderney Race; but, with the wind between southwest by west and south by west, and the northeastern stream running through these channels, to prevent being drifted too far northward a 91° course may be shaped from the first position given (300° 9 miles from the Casquets), which leads about 2.5 or 3 miles from the shore on the meridian of Cape de la Hague, and Cherbourg Road can then be gained without difficulty, whereas with southwesterly winds, if during the eastern stream the meridian of Cape de la Hague should be crossed at 6 or 7 miles from the shore, a sailing vessel runs great risk of missing the entrance to Cherbourg Road. During the western stream, with a fresh breeze, a heavy sea will be found off the entrances of all these channels.

At night.—Approaching the western channel into Cherbourg Road, when eastward of Cape de la Hague, keep its light in sight over the land until Querqueville fixed white light bears 186°, then stand to the southward for the entrance, and when the occulting white and red light in Fort Impérial, Ile Pelée, is nearly in line with the group-flashing white and red light on the western end of Cherbourg Breakwater, be guided by the latter in entering the road.

The most unfavorable winds for a sailing vessel to approach Cherbourg from the direction of the Casquets are those from the eastward, and especially a southeasterly wind. With a moderate breeze, however, from these quarters, the sea is generally smooth, and during the eastern stream the passage is not difficult, but with the western stream it is for a sailing vessel impossible, and she should then make a long board to the northward and endeavor to hold her own until the stream slacks; then the shore should be again approached, to take advantage of the first of the eastern stream, and long boards made in order to reach the roadstead or a position eastward of its meridian, so as to enter with the latter part of the flood or the beginning of the ebb. On account of the great strength of the tidal streams calm and fog are chiefly to be feared when making this passage, and, if threatened by either, every effort should be made to get into the middle of the channel, where the streams are much weaker than near the French Coast.

From the eastward.—The course and distance from 2 miles southward of the Royal Sovereign Light Vessel to Cape Barfleur is 229° 88 miles. Sailing vessels coming from the North Sea or from the northern part of the English Channel and bound for Cherbourg with the wind between north and east, after clearing Dover Strait, generally steer direct for Cape Barfleur, but with other winds they should endeavor to confirm their reckoning by the bearings of some headland on the English or French coasts, thus, with northerly winds, Beachy Head should be made, and, with southerly winds, Cape d'Antifer or the lighthouse at Fecamp, which latter may be seen at a distance of 20 miles.

The most unfavorable winds for making this passage are those between northwest by west and southwest by west, but as the change of stream in midchannel is 2 or 3 hours later than near the shore it is often possible to keep in a favorable stream 8 or 9 hours out of the 12. Approaching Cape Barfleur during the eastern stream, in order to avoid being drawn into the bay of the Seine or into Barfleur Race, where the tide runs with great strength, do not stand into less than 22 fathoms water, which depth may be found about 2 miles from the cape; the same distance and depth should also be preserved with the west-going stream to keep outside the race and the short chopping sea off that cape on a weather tide.

Between Cape Barfleur and Cape Levi do not stand into less than 26 fathoms, as the dangers between these capes extend 2.5 miles from the shore, and a berth of at least 2 miles should be given to Cape Levi to clear the foul ground off it. To avoid being embayed between Cape Levi and Ile Pelee, where a sudden shift wind might place her in difficulty, and also to avoid the dangers on Ile Pelee Flat, a large vessel turning to windward between the cape and the island should not stand farther southward than to have Querqueville spire in line with the northern tangent of Fort Central; at night she should tack when Fort de l'Ouest Light bears 254°, or Cape Levi Light 85°.

Leaving Cherbourg. — Sailing vessels bound westward from Cherbourg do well not to leave the road until the wind is sufficiently settled to carry them clear of the English Channel. They generally stand out through the western channel at the commencement of the ebb, and if the wind is light, after passing Fort du Homet, borrow toward Cherbour Breakwater to avoid Querqueville Breakwater and the Chavagnac Rock, toward which the ebb stream sets. When on the meridian of Cape de la Hague and 6 or 7 miles from it they steer about 276° until the Casquets bear 141°, when a 243° course takes them out of the channel.

These courses lead out of the influence of the streams running through the Casquet and Swinge Channels and Alderney Race and in the direction of the offing streams, and also sufficiently near the Island of Ushant to admit of taking a departure from it if the weather is clear; if the weather is not favorable the chief object is to make westing, and Ushant should be given a wide berth. If bound into the Gulf of St. Malo and intending to pass through Alderney Race, vessels should endeavor so to time their leaving Cherbourg as to be at the entrance of the Race toward half ebb by the shore; that is, at the end of the northeastern stream in that channel, and they should then steer so as to pass through the center of it.

Bound eastward from the Rade de Cherbourg with a westerly wind, weigh toward half flood; or, if the bassin-à-flot of the Port du Commerce, quit it as soon as the gates are open and run out by the eastern channel. When well clear of this channel, a vessel leaving the road at half flood by the shore will have the beginning of the channel flood stream, and if favored with a fresh breeze she will carry that stream for 8 or 9 hours to the eastward.

The coast between Ile Pelee and Cape Levi, which bears from it 74° 4 miles, forms a bight where sailing vessels should avoid getting embayed. From Ile Pelee Breakwater to the middle of this bight, the shore is low and broken into small projections, of which the most remarkable is Heu Point in front of Bretteville Village. A short distance inland are the calcareous cliffs known as Becquet Quarries, one of the most remarkable objects in the neighborhood of Cherbourg. Brique Point, with a mound on it, and its steep sides covered with verdure, is also conspicuous; it bears 63° 1.5 miles from Heu Point. About 200 yards 231° of this is Le Castel, another mound of similar form with a guardhouse on its summit. The tower of Maupertuis Church, about 2 miles eastward of Bretteville Church, is a useful landmark for this part of the coast.

Port du Becquet, 1,400 yards southeastward of Ile Pelee Breakwater and nearly a mile westward of Heu Point is in front of a group of houses close to the shore. It is formed by a pier running parallel with the shore and closed at the western end, the entrance being at the eastern end; it is a grounding place about 300 yards long and 55 yards wide, surrounded by quays of dry stone work; within it the depth is only from 12 to 15 feet at high-water springs, and the sea is much felt during strong northeasterly winds; it is used only by fishing boats and by small craft loading with stone from the Becquet Quarries.

A lifeboat is stationed here.

Leading lights.—Two leading lights are exhibited at Port du Becquet from iron standards 76 yards apart; the inner light is fixed red, elevated 29 feet above high water, and visible through an arc of 16° on either side of the leading line, the power of the light increasing as that line is approached. The outer light is fixed white and 26 feet above high water. They are visible, respectively, at the distance of 8 and 6 miles, and when in line bearing 186° lead midway between the pierhead and a black beacon turret marking the northern side of the Tounettes, a mass of rocks eastward of the pier between which and it is the entrance, about 55 yards wide.

The Grunes de Bretteville is the rocky ground extending 1,500 yards from the shore between Heu and Brique Points; near the outer edge there is a patch with only 13 feet water, with 4¼ fathoms close in side and depths of 6 to 10 fathoms a short distance outside. From the shoal spot Le Castel bears 102° and Bretteville Church tower 206°.

Cape Levi Port is in the bight 1,200 yards southwestward of the cape of that name; the shore is not accessible, even at high water, except where a small cove has been converted into this little port by means of two stone jetties, affording fair shelter to fishing craft and coasters, but strong northerly and northwesterly winds send in much surf. The harbor is dry until 2 hours flood, and the depth at high water is only from 9 to 12 feet. A black beacon turret stands on a rock near the entrance, which should be left on the port hand in entering. A small red buoy is moored 100 yards off the entrance to assist vessels warping out or in.

A lifeboat is stationed at this port.

Anchorage.—At 600 or 800 yards, 254° and 276°, from the jetties there is good holding ground in a depth of 9 fathoms muddy bottom, where vessels found eastward against a foul wind may wait in safety for change of tide. This anchorage is protected by Fort Levi, which stands on the northern point of the bay, and a good berth is with the semaphore seen midway between the fort and Cape Levi Lighthouse.

Cape Levi is low, being the northern termination of some low hills detached from the highlands of the interior. On the highest parts of these hills stand two houses, very close to each other, which may be seen from a considerable distance. The northern house is an old semaphore station and the other a guardhouse. Several rocky patches which uncover extend as far as 800 yards northeastward from the cape. The outer patch is terminated by the Bieroc, a remarkable rock with a rounded head 5 or 6 feet above the level of high water.

Light.—On the extreme of Cape Levi stands a square lighthouse, 105 feet in height, from which at an elevation of 115 feet above high water is exhibited a quick-flashing red light, visible in clear weather from a distance of 15 miles.

Semaphore.—There is a semaphore station on a mound about 13 feet high, 383 yards southeastward of the lighthouse.

Cape Levi Race is occasioned by the strong tides and uneven rocky ground which extends 1° 2 miles from the cape. This rocky ground is in some places ½ mile wide, is considerably higher than the general level of the bottom, and as it lies across the direction of the tidal streams it causes a heavy sea, especially on a weather tide. It is stated by local pilots that with strong easterly winds on the flood at springs this race is as dangerous and the sea as bad as in Alderney Race.

Some patches rising from the rocky bottom in this race are dangerous even for small vessels at all times of tide. They are the Bieroc Patch, Basse du Cap Levi, Pierre Noire, and Tete Septentrionale, or northern head of the race.

The Bieroc Patch is small and rocky, covered with only 3 feet at low water, and is situated 300 yards northward of the Bieroc, from which it derives its name.

Basse du Cap Levi is a rocky ledge about 400 yards long 320° and 140° and 300 yards wide. At its southeastern point is a dangerous 13-foot patch 310° 1,100 yards from the Bieroc.

Pierre Noire—Bell buoy.—The Pierre Noire bears north 1 mile from the summit of the Bieroc. It is one of the most dangerous rocks in the race, having only 7 feet over it at the lowest tide. A black bell buoy is moored outside its northeastern extreme. It, however, occasionally breaks adrift.

The Tete Septentrionale is at the northwestern extreme of the rocky bottom 338° 1.5 miles from the Bieroc, 60° rather more than 6 miles from Fort Central, and 281° 8.7 miles from Cape Barfleur Lighthouse. There is a depth of 5½ fathoms on this rocky head at low water, but as it rises precipitously from soundings of about 21 fathoms, great eddies are caused and the sea breaks on it in bad weather.

Tidal streams.—Between Cape Levi and the Bieroc the eastern stream commences at the time of low water at Cherbourg and it extends farther out as the tide rises, commencing at the Tete Septentrionale at 1½ hours flood; its greatest strength is 5 knots. The flood sets 57°, the ebb 271°. The western stream commences inshore half an hour before high water at Cherbourg, but does not extend so far out as the Pierre Noire until 2 hours ebb.

Vessels of moderate draft in charge of pilots may, if the weather permits, pass through the race between the Basse du Cap Levi and the Pierre Noire, at low water, but large vessels should always pass northward of the race.

The Coast between Cape Levi and Cape Barfleur, which are distant 8 miles from each other and on the same parallel of latitude, is generally low and sandy, but the adjacent lands rise at a short distance from the shore and are joined to the hills in the interior by slight undulations, of which the highest are Carneville Heath, the woody mound at St. Pierre, the hills bounding Saire Valley, and Pernelle Hill.

Anse de la Mondree, immediately eastward of Cape Levi, between the Bieroc and Blanche Rocks, is about 1.5 miles wide and recedes about 1,400 yards; there is good anchorage on its western side in a depth of 7½ fathoms, muddy bottom, where vessels turning to windward against westerly winds may wait during the flood, but it must be used only in the finest weather, for should a vessel surprised at anchor here by strong winds from northwest by west to northeast by north be compelled to weigh during the flood, she would be driven among the numerous dangers off the coast to the eastward. The best anchorage is with the Bieroc bearing 300° 700 yards and the semaphore on Cape Levi about 231°.

With strong northerly winds no landing can be effected in this bay nor upon any part of the coast between Capes Levi and Barfleur, except in Roubaril Cove near the latter.

Roubaril Cove.—This small cove, ½ mile westward of Cape Barfleur is sheltered by a little stone jetty, behind which fishing boats lie, and in the cove coasters take refuge in time of need. The local fishermen state that in case of necessity a vessel under 12 feet draft might be saved by running into it at high water. The cove is about 100 yards wide and 200 yards deep, and the rocks bordering its sides are always uncovered. The water flows into it at about half flood.

An iron beacon painted in red and black horizontal bands and surmounted by a ball top mark 17 feet above high water marks the Houmaizel Rock at the entrance of the cove.

Dangers off the Coast.—The coast between Capes Levi and Barfleur is studded with dangers, of which some extend 2.5 miles into the offing; between them and the shore are the Hedouin and other winding channels, through which coasting vessels with good pilots may pass even at low water.

The Sen is a small isolated rock, just awash at the lowest tides, 1,600 yards from the shore 12° from Coqueville Church.

Basses du Sen.—These shoals are numerous separate patches extending westward, northward, and eastward of the Sen Rock. The shoal northward of the rock is 1,600 yards long and 700 yards wide; it has two dangerous rocky heads, of which one has only 4½ feet water; on the other, which from its position is called the Tete du Milieu, there is 1 foot more water.

Northwestward of this shoal are four isolated rocky heads, with from 21 to 31 feet water. From the Tete du Nord-Ouest, the outer of these heads, Gatteville Church tower in line with a rock awash at the highest neaps at Neville Point bears 120°, and St. Pierre Church tower in line with a house at Coqueville, which on that bearing appears to stand a little westward of Coqueville Church tower, 175°.

A fifth rocky head, with 9 fathoms water, lies 355° 1,600 yards from the Tete du Milieu; it is dangerous only on account of the heavy sea occasioned by the eddies.

There are no dangers between the Sen Shoals and Cape Levi Race, and a depth of 6 or 7 fathoms will be found at the outer edges of the rocks and banks, which extend as far as 1,200 yards from the shore.

Anse de Vicq—Coqueville Light.—A white, red, and green light has been established at Coqueville.

Renier Flat—Beacons.—The Renier is a small rock uncovering 4 feet at the northern angle of a triangular rocky flat about 1 mile from the shore, on which a number of rocky heads uncover at low water. At its southeastern angle are the Trois-Pierres, which dry 13 feet, marked by an iron beacon surmounted by a ball 17 feet above high water. A white beacon has also been placed on the Cabot Rock about 1,600 yards west from the Trois-Pierres Beacon, and another on the rocks extending from Neville Point, these beacons being intended to facilitate the navigation of the Hedouin Channel, lying between the Renier Flat and the shore.

Basses du Renier—Buoy.—These shoals are from 1 to 1.5 miles northeastward and northward of the Renier Rock; they form three distinct patches, the Basse du Sud-Est with 21 feet water, Basse du Centre with 15 feet, and Basse du Nord-Ouest with 26 feet. A black buoy with spherical top mark is moored northward of the 15-foot spot on the Basse du Centre.

The Basse du Nord-Ouest is the outer danger between Cape Levi and Cape Barfleur; it is about 2.5 miles from the shore and only 400 yards within the 20-fathom curve of soundings bordering the coast. From its shoalest spot of 26 feet Cape Barfluer Lighthouse bears 125° rather more than 5 miles, and Cape Levi Lighthouse 233° 4.8 miles.

One mile 96° from the shoalest part of the Basse du Nord-Ouest is a small patch with 8 fathoms water, and as it rises precipitously from soundings of from 14 to 19 fathoms it occasions dangerous eddies and overfalls during strong winds. The eddies caused by both the Renier and Sen Shoals raise a heavy sea during a weather tide.

Clearing marks.—Fort du Roule, Cherbourg, in line with Bieroc Rock off Cape Levi 231°, clears the Basses du Renier to the northward and Gouberville Church tower in line with Neville Rock Beacon 161° clears them eastward.

The Roquette, a small, isolated, rocky patch of only 4 feet water, lies 4° about 1.1 miles from the beacon off Neville Point, and 303° 3 miles from Cape Barfluer Lighthouse. There is another patch with 5 fathoms 141° 400 yards from the Roquette, and many others lie between the Roquette and the Renier.

Plateau des Equets is a rocky ridge about 1 mile southeastward from the Roquette and 307° 2 miles from Cape Barfluer Lighthouse; it is of a circular form, about 600 yards in diameter, and has four dangerous heads, of which the highest rises from its southern part and uncovers 2 feet; there is a depth of from 2 to 5 feet on the other heads.

Haut-Fond des Equets, a rocky patch covered by 28 feet water, with depths of from 10 to 12 fathoms around it, lies 1.7 miles from the shore, 800 yards northward of the Plateau des Equets, and about 314° 2.3 miles from Cape Barfluer Lighthouse. The marks for it are the tower of St. Pierre Church, seen between the church tower and redoubt at Retoville, and the small tower of Gatteville Church, in line with a powder magazine on the shore near the guardhouse at Gatteville.

Banc de St. Pierre is a collection of sand and broken shells, connected with and extending in a southeasterly direction 1.8 miles from the Plateau des Equets, and terminating at the depth of 25 feet 6° 1,100 yards from Cape Barfluer Lighthouse. The shoal part of the bank is about 800 yards wide and has four patches of from 3 to 6 feet water; and on the south part of the bank a shoal of shifting sand, which dries at lowest tides, from which Monfarville steeple is in line with the east side of Roubaril Cove, 174°, and the northern house on Mares Point is just visible southward of the beacon on Neville Rock. The sea breaks very heavily in bad weather on this bank during a weather tide; this must cause the depth frequently to vary, but the body of the bank remains stationary.

Directions.—Vessels of deep draft, and even small craft without pilots should keep outside the dangers just described, which extend

2.5 miles from the shore between Cape Levi and Cape Barfleur, and the directions given for approaching Cherbourg from the eastward should be attended to. At night, in clear weather, bearings of the lights of Cherbourg, Cape Levi, and Cape Barfleur greatly assist the mariner in avoiding these dangers, which should not be approached within a depth of 26 fathoms, but in thick weather vessels should keep well offshore, as the lead does not give sufficient warning of their proximity.

Tidal streams.—At 2.5 miles from the land between Cape Levi and Cape Barfleur the flood or eastern stream commences about the time of half flood by the shore and ends at half ebb. It attains its greatest speed at high water and the west-going stream its greatest speed at low water by the shore. From the northern part of Cape Levi Race to 2 or 3 miles in the offing, the direction of both streams, during their great strength at springs, is east and west, and the rate of the flood is from 3½ to 4 knots, the ebb something less. Outside and among the Sen and Renier Shoals their direction is 96° and 276° and their rate about the same, but as the meridian of Cape Barfleur is approached the flood stream inclines more to the southeastward and its strength increases. At 2 miles northward of Cape Barfleur the flood runs southeast by east 5 or 6 knots, the ebb northwest by west with nearly equal velocity.

Cape Barfleur—Beacon.—Cape Barfleur is the northeastern extreme of the Cotentin Peninsula and the western extreme of the Baie de la Seine; it is a low point, off which in a 108° direction at about 1 mile, as also on its northwestern side are some rocks which uncover at low water, and eastward of it are reefs causing the race presently described. Two towers of unequal height, about 80 feet apart, stand at the extreme of the point and serve to mark its position by day. A red iron beacon with conical framework top mark 18 feet above high water stands on a rock 71° about 800 yards from the lighthouse.

Light.—The highest or southern tower on Cape Barfleur, circular, and 233 feet in height, is now officially named the Barfleur-Gatteville Lighthouse; from it is exhibited at an elevation of 236 feet above high water a group-flashing white electric light. The light is visible 22 miles; the illuminating power of the light is greatly increased in thick weather.

Fog signal.—During thick or foggy weather a siren established in the upper gallery of the lighthouse is worked by compressed air.

Semaphore.—The northern tower on Cape Barfleur is the semaphore station.

When the sun shines on these towers the lighthouse may be seen from a distance of 15 or 16 miles and the semaphore tower at 11 or

12 miles. They are difficult to distinguish when at some distance northeastward of them on account of the highland at their back; this land, however, has a remarkable break in its formation, which assists to mark their position—it is the valley of the little River Saire, called Coupee du Vaast, which lies 220° 5.5 miles from the lighthouse. Pernelle Hill is also a remarkable object, the church on its summit attracting particular notice; it bears 195° 4.8 miles from the lighthouse, and when seen on a 140°, 185°, or 320° bearing, the hill has the appearance of a promontory sloping gradually toward the sea.

Barfleur Race.—This race is occasioned by the impetuous rush of the tidal streams over the rocks forming a submarine extension of Cape Barfleur. These rocks are based on the flat joining the land and extending about a mile between 75° and 120° from the lighthouse as far as the line of Pernelle and Monfarville Church towers in one. They form three separate reefs. The first, with from 7 to 25 feet water, extends 63° ½ mile from the lighthouse; the second, separated from the first by a deep called the Breche-du-Raz, has a rock with only 17 feet water lying 77° about 1,300 yards from the lighthouse; the third, named the Riden de Quenanville, is southward of the others and separated from them by another deep about 800 yards wide.

This latter reef, 400 yards wide, extends ½ mile in a 96° and 276° direction, and its shoalest spot of 7 feet lies with the guardhouse on the summit of the eastern point of Roubaril Cove, touching the southern part of the highest of the houses (light-keepers' dwelling) about 250 yards southwestward of the lighthouse, and Reville Church spire, in line with the western side of a cluster of houses at the Château de Monfarville, which château stands 1 mile southward of Barfleur Church, and being of a brown color contrasts strongly with the trees surrounding it.

Barfleur Race is especially dangerous at springs, when the streams run through at the rate of 8 or 9 knots, and with a fresh wind, and particularly with strong northeasterly gales, the sea breaks violently throughout its whole extent. The broken water in the race, however, depends generally upon the velocity and the hour of the tide, and it sometimes extends 3 or 4 miles in an easterly direction from the lighthouse. At neaps the streams are not so strong and the race is quieter.

At slack water and with a moderate breeze the extension of the race is only a strong rippling, and the most agitated part of it is not more than 400 or 600 yards wide. Fishermen under these circumstances cross it passing through the Breche-du-Raz. Barfleur pilots also take small vessels through it at such times, and to do so they only carry sufficient sail to steer well, so as to avoid the broken water and to keep the vessel's head to the sea.

Vessels entering the Baie de la Seine from the westward should avoid Barfleur Race by giving the cape a berth of at least 2 miles in rough weather and of 1.5 miles in fine weather.

Table showing the direction and rate of the tidal streams at certain times of tide, during ordinary springs, between and in the vicinity of the Casquets and Cape Barfleur.

Position and tidal stream.	Time with reference to high water at Cherbourg.[1]	Direction.	Rate.	Duration at the rate given.
11 miles 265° from Casquets:	h. m.		Knots.	h. m.
Beginning of flood	4 0 before	120°	0.2	
	1 45 before	85°	4.0	
	At high water	60°	4.0	
Beginning of ebb	2 10 after	300°	0.2	
	4 40 after	265°	4.0	
	6 15 after	220°	4.0	
	4 40 before	From 185° to 130°.	1.0	
12.5 miles 320° from Casquets:				
Beginning of flood	3 50 before	185°	0.1	
	2 50 before	95°	1.1	
	At high water	75°	2.4	2 0
Beginning of ebb	2 50 after	140°	0.1	
	5 50 before	230°	2.7	2 0
In the middle of Alderney Race:				
Beginning of flood	3 10 before	85°		
	0 20 before	50° and 30°	7.5	3 0
Beginning of ebb	2 50 after	300°		
	3 40 after, to	230°, 210°, and 185°.	7.0	3 30
	4 40 before.			
16 miles 338° from Cape de la Hague:				
Beginning of flood	3 15 before		0.0	
	At high water	85°	3.9	2 0
Beginning of ebb	2 45 after		0.0	
	5 45 after	255°	3.7	2 0
5.5 miles 46° from cape de la Hague:				
Beginning of flood	3 0 before			
	0 10 before	75° and 95°	4.0	2 30
Beginning of ebb	2 50 after			
	6 0 after	265°	3.5	3 0
1 mile 320° from Querqueville fort: Maximum of ebb.	4 50 after	300°	3.7	
1.5 miles 30° from Querqueville fort: Maximum of flood.	2 45 before	120°	4.0	2 0
2 miles 6° from Cherbourg breakwater:				
Beginning of flood	3 20 before			
	0 45 before	90°	3.0	
	2 0 after	175°	0.6	
Beginning of ebb	2 20 after			
	5 30 after	275°	2.5	
29 miles 40° from cape de la Hague:				
Beginning of flood	2 45 before	175°	0.2	
	1 45 before	95°	2.7	
	At high water	90°	5.0	1 30
	1 45 after	90°	2.5	
Beginning of ebb	3 15 after		0.0	
	4 35 after	275°	2.3	
	5 50 before	270°	4.0	2 0
	4 15 before	270°	2.3	
2 miles 6° from Cape Barfleur:				
Beginning of flood	3 45 before			
	1 0 before	120°	6.0	1 0
Beginning of ebb	2 5 after			
	5 0 after	From 320° to 275°.	5.5	1 15
7 miles 6° from Cape Barfleur:				
Beginning of flood	3 0 before			
	1 0 before	100°	6.0	
Beginning of ebb	2 50 after			
	5 30 after	300°	5.5	1 15
21 miles 74° from Cape Barfleur:				
Beginning of flood	2 30 before	300°	0.4	
	0 30 after	115°	3.8	3 0
Beginning of ebb	3 20 after	95°	0.3	
	6 0 before	295°	3.5	2 30

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[1] It is high water at Cherbourg about 3 hours before high water at Dover.

For further information *see* Atlas of Tidal Streams, English and Irish Channels, 1899; also Atlas of Tidal Streams, Channel Islands, 1903.

CHAPTER X.

BAIE DE LA SEINE—CAPE BARFLEUR TO CAPE D'ANTIFER.

Baie de la Seine is the deep bight comprised between Cape Barfleur and Cape D'Antifer, which latter bears from the former 90° 55 miles. The coast of the bay recedes from this line about 24 miles toward the mouth of the river Orne; and its circuit, excluding the shores of the Seine estuary and of the Grand Vay, is about 96 miles.

It is open to all winds from northwest by west round by north to northeast by north, and a heavy sea is thrown into it when they blow with any strength. At springs, the tidal streams, run at the rate of 3 or 4 knots. All the indentations in the coast, out of the fair line of the tidal streams, are blocked up by sand and by the accumulations deposited by the rivers, and all the harbors, except Havre and Port-en-Bessin, are dry at low water, and, during neaps, there is but little water in any of them even at high water; a vessel embayed here, therefore, during strong northerly winds is in a dangerous position.

The principal headlands and harbors are well lighted and thus distinctly marked at night; but the lights as well as the characteristics of the coast by day, are frequently obscured by haze and fogs (which are more prevalent here than at other parts), and at times prove very embarrassing.

The coast.—From Cape Barfleur the coast trends southward 5.7 miles to Pointe de Saire; it is generally low and of rocky granite formation with reefs extending some distance from the shore. Seen from the offing the land here appears well wooded, church steeples showing here and there above the trees. As previously mentioned, Pernelle Hill and church, 3 miles northwestward of Saire Point, are conspicuous objects. From Saire Point the land falls back westward, forming at 3 miles southward of that point the Rade de la Hougue; the little ports of Barfleur, Reville, St. Vaast, and La Hougue, all lying between Cape Barfleur and the Grande de la Hougue.

From La Hougue the shores of the bay are generally low and sandy, with off-lying shoals and sand banks in the western part, but eastward of Maisy Point it is more diversified, and in the neighborhood of Percee Point, which bears 143° 22.5 miles from Cape Barfleur, are high chalk cliffs, visible from a distance of 12 or 15 miles. The ports of Carentan and Isigny are in the deep bight of the Grand Vay, westward of Point Maisy. From Percee Point, Beuzeval Point, the southern boundary of the estuary of the Seine, bears 100° 33 miles, the intervening coast, described hereafter in detail, consisting partly of cliffs or chalk or of rock and brown clay, and partly of low sand hills with a moderately high and well-cultivated interior. The ports within this space are Port-en-Bessin, Courseulles, Oyestreham, and Caen, the latter 9 miles above Oyestreham on the River Orme, and the River Dives, just westward of Beuzeval Hill.

From Beuzeval Point the white chalk cliffs of Cape de la Heve bear 24° 13.5 miles, the whole intervening space being occupied by the shallows, banks, and channels of the Seine estuary, on the southern shore of which is the harbor of Trouville and the port of Honfleur, whilst on the northern shore is the large and important port of Havre. The River Seine is navigable for large vessels as high as Rouen. From Cape de la Heve the chalf cliffs forming the coast line trend almost directly 21° 11.5 miles to cape D'Antifer, the shore being safe of approach within 1 mile for the whole distance between the two capes but without port or harbor of any description.

Soundings.—The depths in the Baie de la Seine are very regular, varying, in line between Cape Barfleur and Cape D'Antifer, from 24 fathoms near the former to 18 fathoms near the latter, and from those depths decreasing very gradually toward the off-lying banks in the southwestern part of the bay toward the southern and eastern shores and toward the extensive flats off the mouth of the Seine.

Wreck buoy.—A large white spindle buoy is moored in about 20 fathoms in the southwestern part of the Baie de la Seine, nearly 10 miles 32° from Percee Point, the nearest land, in the position noted in the margin. It marks the place where the ship *Cubana* foundered in the year 1862, and is maintained in position, not that the wreck is any longer a danger to navigation, but for the safety of the trawls and nets of fishermen.

Port Barfleur.—The entrance to this little port bears 167° 1.5 miles from Cape Barfleur Lighthouse, and its position is indicated by the church, with its square tower and no spire, standing on the northern point of entrance. The port, only 600 yards long and 400 yards wide, is sheltered by the land from south by east around by west to north by east and protected from the sea during strong easterly winds by the Antiquaires and other rocky beds fronting the entrance, in which are moored four warping buoys to assist vessels entering or leaving.

A small stone jetty extends 53 yards in a southerly direction from the northern point of entrance, and a breakwater 220 yards long extends north by east from the southern entrance point. The head of the northern jetty bears from the outer end of the breakwater about west by north 110 yards. The bottom of the port is generally mud mixed with broken shells, sand, and gravel, and is good for vessels taking the ground, but there are some rocky patches which should be avoided. Vessels not going alongside the quay should moor securely to the large iron rings fixed in the rocks, as there is a good deal of sea with easterly winds when the Antiquaires Rocks are covered.

Depths.—The port dries throughout at low-water springs. Vessels loading or unloading lie alongside the North Quay, which is nearly 300 yards long, and where the bottom is from 4 to 8 feet above the lowest tides and the berths are soft and good; the bottom over the rest of the port is from 4 to 10 feet above that level. Vessels of 14 feet draft can enter the harbor at springs, but it is only available for those of 6 feet at the lowest neaps.

Tide scales upon the jetty head and inside the port near the lifeboat house show the height of the tide above a fixed datum which is 5 feet above the chart zero.

Trade.—The port, though connected with the general railway system, is of but little commercial importance. Granite for building purposes is quarried in the neighborhood. The little traffic carried on is in flax, hemp, vegetables, fruit, butter, oysters, and fish.

Dangers.—The outer danger in approaching Port Barfleur is the Riden des Dents, a rocky shoal, on which is a dangerous patch with only 9 feet water about a mile from the shore, and bearing 89° from Gatteville church tower. The Anglais Rocks bear about 42° 800 yards from the North Jetty end, and the Vinberge Rock, the highest head, uncovers 7 feet. The Hintar Rock, 77° 450 yards from Vinberge Rock and 52° ½ mile from the breakwater end, uncovers 2 feet; a large iron ring is fixed on it for the convenience of vessels warping into harbor or anchoring near it in the road.

Buoys and beacons.—On the northwestern side of the entrance a red buoy, with conical top mark, is moored just southward of the Grotte Rock, and two other red buoys mark the Anglais and Vinberge Rocks; a red buoy also marks the Ronde Rock at the entrance; it is only about 50 yards from the breakwater end, and vessels entering must pass between it and the breakwater. On the southeastern side are a black buoy, with staff and cylinder, marking the Hintar Rock, two beacons marking, respectively, the Raie and Grosse-Haie Rocks, and a black warping buoy marking the Hoisier Rock near the breakwater. There is also a third beacon marking the Fourquie Rock, a short distance southeastward of the entrance.

A lifeboat is stationed at Port Barfleur.

Lights.—Two fixed white leading lights are exhibited from square towers, the front one at an elevation of 23 feet above high water, on a point on the southern side of the harbor 330 yards within the breakwater end; the other at the head of the harbor, elevated 43 feet above high water and bearing 219° 308 yards from the former; both are visible 7 miles, and when in line they lead to the entrance.

Two small fixed lights are also shown, one, red, near the head of the breakwater or southern jetty, the other, green, near the head of the northern jetty. These two lights in line lead through the southern passage up to the harbor entrance.

Fog bell.—Barfleur church bell is sounded continuously during foggy weather for one hour about the time of high water.

Directions.—A vessel rounding Cape Barfleur from the westward and bound to Port Barfleur, after passing the swell at the outer end of Barfleur Race, should take care not to go westward of Pernelle and Monfarville church towers in line bearing 208° unless of very light draft or unless the tide has risen considerably. The two harbor lighthouses by day or lights by night, in line bearing 219°, lead over a least depth of 4¼ fathoms through the channel to the port between the western rocks of the Antiquaires Reef and the dangers bordering the shore between Cape Barfleur and the northern point of the port, leaving on the starboard hand the four red buoys already described and on the port hand the black buoys and beacons.

The channel narrows considerably between the Hintar and Anglais Rocks, and from thence to the entrance is but 120 yards in width. At the entrance it is only about 50 yards wide between the Ronde buoy and the head of the breakwater.

Anchorage.—Vessels arriving before high water with offshore winds may anchor in Barfleur Road, which is a small deep between the Plateau des Antiquaires and the Gaillarde and Anglais Rocks. The best anchorage is in about 5 fathoms, good holding ground, with the lower leading light a little open to the left of the higher light or with Pernelle and Monfarville church towers in line 208° and Crabet Mill, in ruins and without sails (whitewashed on its southeastern side), just open northward of Masse Point. This anchorage ought only to be used during offshore winds and in fine weather; should a vessel, however, be surprised in it by strong northerly or easterly winds she must moor with open hawse to the northward and with the heaviest anchor to the eastward; the anchorage being of small extent, it will be necessary to heave short as the water falls to prevent tailing on the rocks.

Tides and tidal streams.—It is high water, full and change, in Port Barfleur at 8h. 59m.; ordinary springs rise 21¼ feet, neaps 16½ feet above the level of the soundings on the plan, which are about

3¼ feet below the level of low water, ordinary springs. Ordinary springs range 19 feet, neaps 9¾ feet. The tides are very regular, but with strong prevailing southwesterly winds the water rises higher and with strong and lasting winds in the opposite direction remains lower than the general level; this is also the case in all the harbors of the bay of the Seine. The mean duration of the rising tide is 5h. 50m., and of the falling tide 6h. 35m., but the duration of the rising tide between a neap and the following spring tide exceeds 6 hours and sometimes reaches 6½ hours, while between a spring and the following neap it is below the mean.

The first part of the flood stream follows the direction of the shore from Cape Barfleur and crosses the road and channel. Its greatest rate does not exceed 3 knots and it decreases suddenly at about half flood, when an eddy commences in the opposite direction but with rather less speed. This eddy is weak about high water, but its rate increases as soon as the tide begins to fall.

Moulard Point is low and bears 145° 1¼ miles from Barfleur Church. Rocks which uncover at low water lie off the point, and rocky ground with shoal patches extends about a mile from the shore. The Basse Orientale du Moulard is the outer or eastern patch; it has 26 feet water, lies 69° 1,600 yards from the Moulard Rock Beacon turret, and from it Crabet Mill is on with the northern extreme of l'Ilet at Barfleur. Vessels should keep a mile from the shore between Barfleur and this point whilst the Moulard Rock is uncovered.

L'Ilet Rock.—The top of the rock has been whitened and classed as a beacon.

Maumieres Rock Beacon.—A black wooden beacon, with cylindrical topmark 20 feet above high water, has been established on the Maumieres Rock, situated about 1 mile to the northward of Pont de Saire.

Moulard Rock—Beacon turret.—The Moulard is a granite rock on which stands a white beacon turret about 500 yards eastward of Moulard Point; this rock uncovers 22 feet at the lowest tides and is a useful mark to all who navigate along this part of the coast, for when it is covered and the sea smooth there is water for large vessels over all the hidden dangers between Cape Barfleur and La Hougue.

A circular iron beacon with cylindrical topmark, painted black, elevated 23 feet above high water, marks the northern end of the ledge eastward of Moulard Rock.

Life-saving station.—A life-saving station, provided with a rocket apparatus, is established at Montmorin customs watch house, 1 mile southward of Moulard Point.

Pointe de Saire is the first prominent point southward of Cape Barfleur; Pernelle Hill rises 288° 3 miles from the point, the church on its summit forming the most remarkable object on this part of the coast. Reville Battery is at the extreme of Saire Point and one of the lights used in entering La Hougue Road at night is shown from its southwestern face.

Ridens des Ecraoulettes are sand banks about a mile from the shore, a little northward of the line of the church towers of Pernelle and Reville in one, with a sounding of 10 feet on their shoalest parts; Gatteville Church tower and Moulard Rock Beacon turret in line 316° leads northeastward, and La Hougue Tower in line with the highest house of the lazaretto on the western side of Tatihou Island 329° leads southeastward.

Dranguet Rocks—Beacon turret.—About ½ mile southward of the Ecraoulettes are the Dranguet Rocks, which also extend in patches, the outermost, of 27 feet, being 1.3 miles from the shore. They are dangerous even for small vessels and there is a high sea over them during a weather tide. The outer rock, which uncovers, is ½ mile from the shore, and has on it a red beacon turret surmounted by a ball. Barfleur Church tower in line with the Moulard Rock Beacon turret leads eastward of the outer shoal, which is 1,600 yards outside the beacon turret, and lies at a depth of 25 feet at low water.

The Pont de Saire is a sort of rocky causeway extending a mile southeastward from Saire Point nearly to the line of La Hougue Tower touching the northwestern angle of Fort de l'Ilet, which latter is just southward of Tatihou Island. With an onshore wind the sea runs very high on this ridge as long as the tide makes northeastward, i. e., from half flood to low water by the shore.

Roches de Saire Beacon.—A beacon painted red with conical topmark, 22 feet high, is erected on Vitequet Rock, the southeasternmost of the Roches de Saire.

Basses de Reville and de Pernelle.—Several rocky patches lie outside the Pont de Saire, but they are dangerous only in bad weather. Those farthest out are the Reville, with 4½ fathoms, and the Pernelle, with 6 fathoms water. They are half a mile apart, and both lie with Barfleur Lighthouse in line with Moulard Rock Beacon turret 336°, the Reville distant 1.3 miles and the Pernelle 1.7 miles from Saire Point; the cross mark for the Pernelle is Morsaline Lighthouse showing southward of Fort de l'Ilet, bearing west.

The coast.—From Saire Point the direction of the coast changes and trends southwestward. Half a mile westward of the point is the little fishing harbor of Ionville, protected on its eastern side by a small jetty. St. Vaast Point, on which stands the church of the small town from whence the point takes its name, bears 226° 1.8 miles from Saire Point, and the intermediate coast forms a deep bight, at the head of which the waters of the little river Saire, after winding around the northern side of Pernelle Hill, lose themselves on a low, sandy beach. The island of Tatihou, the small Fort de l'Ilet on the rocks close southward of that island, and the rocks which surround them partly close the entrance to this bight; at low water they join the mainland by a beach of gravel, sand, and rock, the whole of the bay from St. Vaast Point to the outer rocks of the Ile de Tatihou and from thence to La Hougue Point being dry or nearly so at the lowest tides.

The Iles de Tatihou and de l'Ilet may be recognized by their old, obsolete, and disused fortifications. The former is used as a quarantine station for Cherbourg, the lazaretto being on its western side; its only occupants are the officers of the quarantine establishment. There is a small jetty and slipway near the lazaretto raised 3 feet above high-water springs.

The narrow, rocky peninsula of La Hougue extends 1 mile 210° from St. Vaast Point. Fort La Hougue occupies its southern and highest part; near the center of the fort and on its western side is the remarkable old round tower of La Hougue. Westward and northward of the fort is a sandy bay 1 mile in depth and width, but which at low water dries completely out to and beyond the extreme point of La Hougue.

St. Vaast.—The town of St. Vaast has a population of about 3,000; its small tidal harbor is on the northern side of St. Vaast Point, northward of a stone jetty extending 69° 440 yards from the shore, with a white iron lighthouse at its outer end. From south by east around by west to north by west it is sheltered by the land and by this jetty, and from the high sea and strong winds from the eastward by Tatihou Island. Protecting the harbor from northeasterly winds is a rough stone breakwater about 440 yards in length 322° and 142°. The entrance to the harbor is 33 yards wide between the southern end of this breakwater and a small jetty running off in a northeasterly direction from the main jetty to protect the building and repairing slip just within it.

The bottom of the harbor is a mixture of sand, gravel, and a little mud, great quantities of rock having been removed and leveled; the berths are good alongside the quays, but farther off they are hard, the rocks being thinly covered. The quay frontage is very extensive considering the requirements of the port, being no less than 470 yards in length.

Depths.—On the western side of the harbor the bottom dries 6 feet and on the eastern side 4 feet above the level of the lowest tides; at high water, ordinary springs, there is at the berths a depth of from 13 to 15 feet, and at the lowest neaps 7 to 8 feet; the harbor is, therefore, inaccessible to vessels over 12 or 14 feet draft under any circumstances. Tide scales on St. Vaast Jetty Head mark the height of water above the beaching berths, where the bottom is 7 feet above the chart zero.

The town of St. Vaast has railway communication with Barfleur and through Valogne with the general system of the country. It has a fine hospital, considerable oyster and other fisheries, and its chief foreign trade is with England for coal and with the Baltic for timber. About 160 vessels (excluding fishing craft and small coasters) enter the port annually; the exports, chiefly fruit and cattle, are unimportant.

The southern and principal passage to the harbor is between the rocky ridge extending southward from the jetty to La Hougue Fort on the western side and Tatihou Island and the rocky ledge which extends ½ mile southeastward of Fort de l'Ilet and terminates in the two rocky groups named the Dent and the Gavendest, on the eastern side; the highest head of the Dent uncovers 7 feet and of the Gavendest 6 feet at low water. The Plateau du Ouest-Drix spreads out southward of these rocky groups and on it is a rocky patch of 13 feet, 600 yards 156° from the Dent.

Buoys and beacon.—The following buoys and beacon mark the southern approach of St. Vaast: A red buoy 50 yards southward of the Gavendest; a red buoy about 100 yards 170° of the Dent; a black buoy on the Manquet Rock off Fort de la Hougue; a black buoy at the edge of the rocks halfway between the Manquet Buoy and St. Vaast jetty head; a black beacon on the Creux Rock about 330 yards 176° from the jetty head.

The red buoys have to be left on the starboard hand, the black buoys and beacon on the port hand in entering from the southward. When round the jetty head several mooring buoys are placed to assist vessels warping into harbor.

Lights.—For the use of vessels entering and leaving St. Vaast and La Hougue Harbors, and also La Hougue Road at night, the following lights are established:—

Reville Light.—From a square tower, 29 feet in height, on the southwestern face of Reville Battery, at the extreme of Saire Point, and at an elevation of 36 feet above high water, is exhibited a fixed white light, visible 9 miles. When in line with Cape Barfleur Light bearing 346° it marks the eastern extent of the dangers near Tatihou Island.

La Hougue Light.—A fixed white light, visible 7 miles, is shown from a square turret, over a white building 28 feet high, at the southern extreme of La Hougue fort, at an elevation of 35 feet above high water.

Morsalines Light.—From a square white tower with building 30 feet high on the heights at Morsalines, at an elevation of 282 feet above high water, a fixed white light is exhibited, visible 9 miles. A mast, 26 feet high, surmounted by a black ball, is in position behind the lantern.

Morsalines Light is in line with La Hougue Light when bearing 267°.

St. Vaast Harbor lights.—A fixed red light, visible 5 miles, is exhibited at an elevation of 39 feet above high water from a white iron turret on the outer end of St. Vaast Jetty. At the entrance a small fixed red light, visible 2 miles, is shown from the northern end of the short jetty, and immediately opposite at the southern end of the breakwater, is a fixed green light, visible 3 miles.

Fog signal.—A bell is sounded in foggy weather at the outer end of St. Vaast Jetty.

A lifeboat is stationed at St. Vaast; also a mortar and rocket apparatus.

Directions.—When bound into St. Vaast Harbor, Morsalines Lighthouse in line with La Hougue Lighthouse, 267°, leads just southward of the 13-foot rock on the Ouest-Drix flat; and when the spire of Reville Church opens westward of Fort de l'Ilet, steer for the end of St. Vaast Jetty, taking care to give a good berth to the remains of three wrecked vessels lying about 400 yards southwestward of Fort de l'Ilet. Morsalines Lighthouse exactly midway between La Hougue Lighthouse and round tower leads between the Ouest-Drix patch and the Gavendest, but this passage should not be attempted when the sea is heavy, nor by a stranger at night.

It is difficult for a sailing vessel to leave St. Vaast Harbor with the wind between southwest and southeast, both flood and ebb running to the northward; but even with those winds small vessels with good pilots may leave the harbor at high water, springs, and pass out northward of Tatihou Island, keeping about 200 yards from its northern shore in passing.

Tides.—During the whole of the rising tide, the stream runs northward between St. Vaast Jetty and Tatihou Island, and with the falling tide it follows the same direction until the highest part of the beach joining that island to the mainland is uncovered, which is at about half ebb. With both streams at their greatest strength, a strong eddy forms at the end of the jetty and extends over the whole harbor, and with a fresh wind from north to northeast, there is a confused sea within, though very much reduced since the construction of the breakwater.

Semaphore.—There is a semaphore station in Fort de la Hougue, about 110 yards northeastward of the round tower.

Port de la Hougue is merely a grounding place, 800 yards long and 200 yards wide, westward and under the ramparts of La Hougue

Fort, which partially shelters it from easterly winds. The water here is generally smooth, but there is considerable sea when it blows freshly from south by west round by east to northeast by north. It admits vessels of about 14 feet draft at high water, springs, and of 9 feet draft at neaps, but since the completion of St. Vaast Harbor it is quite deserted. It might, however, afford useful shelter in bad weather to a vessel of moderate draft compelled to run ashore.

The best grounding place is 200 yards distant from the fort, between the parallels of La Hougue Tower and of the wooden storehouse at the foot of the glacis northward of the fort; this space is bounded westward by a shallow channel which receives all the water flowing from the land. The bottom abreast of the tower dries 7½ feet, and from thence rises gradually toward the northern part of the bay. The bottom is hard, being a mixture of muddy sand and gravel, and yields but little under vessels when aground.

Tides.—It is high water, full and change, in Port de la Hougue at 8 hours 53 minutes. The tide rises abreast of La Hougue Tower from 14 to 15 feet at springs and from 7½ to 8½ feet at the lowest neaps; in the southern part it rises 2 or 3 feet higher. Fresh winds from southwest by south to west raise the tide a foot or two higher than in calm weather, and winds from northeast by north to north have a contrary effect.

Dangers.—The following shoals must be avoided when approaching Port de la Hougue, especially if there is any sea on.

The Manquet, a small isolated rock which uncovers 5 feet 94° from La Hougue Lighthouse, and which, from its prominent position, is much in the way of vessels navigating between La Hougue and St. Vaast. As already described, a black conical buoy is moored near the eastern edge of this rock.

Roche Joly, the top of which uncovers 3 feet, bears 232° 1,250 yards from La Hougue Lighthouse, and the sea breaks on it at high water in bad weather.

Jean de la Dune is a small group of four rocky heads which only uncover at springs; the highest head, awash at low water, bears 193° 1,400 yards from La Hougue Lighthouse. The summits of Jean de la Dune, the Joly, and another rock southward of it, are the highest heads of the Verdieres Reef, a rocky flat, lying nearly parallel with the shore, and on which there is a heavy sea with onshore winds.

Both the Roche Joly and Jean de la Dune are cleared by keeping Pernelle spire a little open eastward of the Du Loup white beacon, standing on the sands in Port de la Hougue.

Rade de la Hougue.—This anchorage is southeastward of Port de la Hougue, and, although the sand banks in its vicinity are well known to be shifting, it affords good anchorage for vessels of deep draft. It extends westward as far as the line of the spires of Reville and St. Vaast churches in one and eastward as far as the Ouest-Drix Flat and the northern part of the Banc de la Rade; its northern limit is the parallel of the Dent and Gavendest Rocks, both marked by red buoys, and its southern boundary the small sand bank named the Haut-Fond de la Grande Rade, on which the least water is 27 feet.

The holding ground is good in almost every part of this anchorage, and vessels are well sheltered by the land from winds between south by west and northwest by west, which are frequent and dangerous in winter, but it is open to winds from north by east to southeast by south, which, even when moderate, send in a troublesome swell, but when blowing with any strength raise a heavy sea.

Quarantine.—Vessels suspected of having contagious diseases on board are sent from all the northern ports of France to ride out their quarantine in this roadstead, and at times many such may be seen at anchor in it. The lazaretto and health office being, as before said, on the western side of Tatihou Island.

The Grande Rade is a small deep in the southern part of La Hougue Road about 1,200 yards long 30° and 210° and 400 yards wide, where large vessels may anchor in excellent holding ground. The best position is in the center of the deep in a depth of from 7 to 8 fathoms, with the church towers of Pernelle and St. Vaast in line 326° and the Bois de la Ville midway between Quineville church tower and a guardhouse on the shore.

The Petite Rade is the space included between the Grande Rade and the rocks off La Hougue Fort, but good holding ground does not extend much eastward of the line of Reville Lighthouse touching the southeastern angle of Fort de l'Ilet. Between this limit and the Grande Rade the bottom is of sand and broken shells and the holding ground indifferent; fresh easterly winds also throw in a heavy sea.

Pilots anchor vessels in a depth of 3½ or 4 fathoms good holding ground, in the space which has the following limits: Quetehou church tower on with La Hougue Point, Morsalines and La Hougue Lighthouses in line, and Reville Lighthouse open a little eastward of Fort de l'Ilet. From this anchorage vessels of moderate draft may, if necessary, run aground for refuge in Port de la Hougue. If drawing, however, and therefore unable to enter either St. Vaast or Port de la Hougue during the lowest neaps, such vessels should anchor in the northern part of La Hougue Road, where they are in some degree sheltered from strong northeasterly winds and the sea by Tatihou Island and the rocks southward of it.

Banc de la Rade.—This bank, of which the northern portion bounds the Rade de la Hougue in a southeasterly direction, is, within the 5-fathoms curve, 4 miles long north and south and, abreast a patch 11 feet 1 mile from the northern end, 1,200 or 1,400 yards wide. There are depths of from 11 to 15 feet on the shoalest parts, and the northern end, where there are soundings of 18 feet close to the 5-fathoms edge, lies about 200 yards eastward of the line of Reville Spire in one with the tower on Tatihou Island and with La Hougue Lighthouse bearing 288°. From this point the Haut-Fond de la Rade, a bank with from 4¼ to 5 fathoms, extends in a northeasterly direction about 1,200 yards to a position whence Cape Barfleur and Reville Lighthouses are in line 346° and La Hougue Lighthouse bears 274°.

Directions.—The entrance to La Hougue Roadstead is between the 13-foot rock on the Plateau du Ouest-Drix and the 3-fathoms patch at the northern end of the Banc de la Rade, which bear from each other 333° and 153°, distant 1,800 yards; the distance on this line between the 5-fathoms curve is 1,400 yards.

Approaching La Hougue Road from the northward, the mariner should take care that his vessel is not drifted southward of it by the flood stream, which, from the extreme of Barfleur Race to about 3 miles off Saire Point, runs southward, following the direction of the coast, at the rate of 3 knots, at springs; close to Saire Point, it changes its direction suddenly to the southwest. Vessels of deep draft should keep outside the off-lying shoal patches by attending to the marks already given for clearing them. When southward of the shoal water off Saire Point, and to avoid the dangers eastward of Tatihou Island, Cape Barfleur Lighthouse must be kept open eastward of Reville Lighthouse until Morsalines and La Hougue Lighthouses are in line, then steer about 232° for the Grande Rade. Running in on this course near low water, Cape Barfleur Light will be hidden for a few moments by Tatihou Tower; directly it reappears westward of the tower bearing 353° a vessel should anchor.

To anchor in the northern part of La Hougue Road by day or night, run in with Morsalines Lighthouse just open southward of La Hougue Lighthouse, in order to pass about 200 yards southward of the shoal patch on the Ouest-Drix, and anchor as soon as Reville Light is hidden by Fort de l'Ilet, or by the tower on Tatihou should the light be seen above the fort, which may be the case toward high water.

Tidal streams.—In the middle of La Hougue Road the stream of flood at springs begins about 4¾ hours before high water in the port, and runs about 232°. It attains its greatest rate, 2½ knots, about 2¾ hours before high water in the harbor, and its mean duration is 5h. 20m. The ebb stream commences about 25 minutes after high water in the port, its mean duration is 7h. 10m., its direction northeast by north and northeast by east, and its greatest rate 2¼ knots, occurs about 4h. 20m. after high water.

Iles St. Marcouf.—These two islands and the rocks round them which uncover at low water, with the Bastin Rock, are nearly midway between Port de la Hougue and the entrance to the Grand Vay, their outer edge being upward of 4 miles from the shore, and they occupy a space about 1,600 yards long 50° and 230° and 500 yards wide. They are but little above the level of high water, but the fort, and especially the large case-mated tower on the highest point of Ile du Large, the eastern island, may be seen when distant 9 to 12 miles.

These islands, distinguished by the names Ile du Large and Ile de Terre, are separated by a narrow channel, through which the tidal streams run with great rapidity; a coasting vessel having missed La Hougue Road, with a strong northwesterly wind and flood tide, may anchor during the remainder of the flood in a small bight, named Mannette, on the southern shore of Ile de Terre, provided she is moored securely and steadied by a hawser to the shore, for the eddies formed by the points of that island occasion a heavy sea.

There is a beacon on Pointe d'Ovy, the southwestern extreme of the reef westward of the Ile du Large. Rocks extend for a distance of 35 yards to the southward of the beacon.

Light.—A flashing white light, visible 13 miles, is exhibited from a masonry tower 47 feet in height on the fort on Ile du Large, the eastern St. Marcouf Island, at an elevation of 56 feet above high water.

Telegraph cable.—St. Marcouf Fort is in telegraphic communication with the mainland. The cable takes a southwesterly direction straight to the shore.

Banc de St. Marcouf extends 3 miles in a 322° direction from St. Marcouf Ile du Large, and the soundings vary from 4¼ to 5½ fathoms between it and the southern part of the Banc de la Rade, which lies 1,400 or 1,600 yards nearer the land. Both banks consist of large masses of sand and broken shells, the Banc de St. Marcouf having from 7 to 12 feet on its shoalest parts. The tides cross them obliquely and occasion strong eddies even in calm weather, and with easterly winds or northerly gales the sea breaks violently upon both banks from half ebb to half flood.

St. Marcouf Bank has off its northern end a narrow ridge of sand, or Haut-Fond, running about 1.8 miles in an easterly direction nearly at right angles with the Banc de la Rade, with 4¾ fathoms at its eastern extreme and from 5¼ to 7 fathoms at other parts, and depths of from 8 to 10 fathoms on either side close to; as it lies nearly across the tidal streams the eddies produced by this narrow bank at springs cause a high sea when it blows hard. St. Marcouf Light, bearing 176°, or Cape Barfleur Lighthouse, open eastward of Moulard Rock Beacon turret, lead outside this bank.

Banc du Cardonnet extends in a 120° direction 6.5 miles within the 5-fathom curve from St. Marcouf Ile de Terre to a position about 13° 3.5 miles from Grand Camp Church and forms at about 4 miles from the shore a barrier in front of the Grand Vay; from its southeastern extreme in 5 fathoms Colleville Church tower is in line with Percee Point 131°. The bank consists of sand and broken shells, and its shoalest parts of from 4 to 10 feet extend from 255° to 142° about a mile from the island; it slopes gradually toward the southwest, but its northeastern side is steep-to, which causes the sea to break heavily on it with strong winds from the northward or eastward or when there is much swell on, and especially during the ebb tide. Farther eastward toward the meridian of Maisy Church the depths on the bank vary from 14 to 17 feet, and the water gradually deepens toward its southeastern extreme.

Channel between Iles St. Marcouf and the coast.—The southeastern entrance to this channel is about on the meridian of the old ruined mill at Cricqueville, and it terminates northwestward at La Hougue Roadstead; it has a depth of 9 fathoms at its southeastern entrance, gradually shoaling to 5½ or 6 fathoms in the northwest, and for deep-draft vessels its navigable width is from 1 to 2 miles. It affords good anchorage in moderate weather and with offshore winds, except 232° of Iles St. Marcouf, where a rocky bottom about 1,600 yards wide almost crosses the channel from the shore, and also 97° and 120° of Quineville, where the rocky shoals of St. Floxel, of 4 fathoms, extend 1.7 miles from the land. The anchorage in the southeastern part, off the entrance to the Grand Vay, is known as Capelle Road.

The dangers to be avoided at low water are the northwestern part of the Cardonnet, which forms a small bank with from 10 to 14 feet water lying in a 300° and 120° direction a mile westward of St. Marcouf Ile de Terre; the rocky shoals of St. Floxel, before mentioned, which extend from the land as far as to bring Pernelle Church open 2° eastward of La Hougue Tower; and the Bavequien Rocks, which uncover at low water and border the beach from the parallel of St. Marcouf Church as far as the line of bearing 97° from Quineville Church.

Local authorities state that a well-found vessel might ride out a heavy gale from the northeastward in this channel, under shelter of the high parts of the Cardonnet, the St. Marcouf, or the Rade Banks, which break the violence of the sea; it is, however, but precarious shelter and should only be resorted to as a last resource when a vessel is embayed and finds it impossible to gain an offing, for the sea in such weather is sure to be very heavy in the channel between the banks on the flood, and a breaking sea is caused by the weather tide on the ebb. If a vessel is obliged to bring up in this channel, such an anchorage should be chosen that, in case she parts or is compelled to run ashore, she may do so where there is some chance of safety for the crew. The Magdeleine Bank at the entrance to the Grand Vay should be carefuly avoided, as it is of hard sand, and a vessel running on it in bad weather would certainly go to pieces.

Directions.—The channel between the St. Marcouf and Cardonnet Banks and the coast may be taken, even at low water, if the weather is moderate and strict attention be paid to the lead. With a fair wind, Percee Point and Huppain Wood in line, 117° leads in the deepest water between the meridian of Maisy Church and St. Marcouf Ile de Terre. From thence steer about 322° until Pernelle Church tower, bearing about 339°, is 3° or 4° open eastward of La Hougue Tower; keep this mark on until Quineville Church bears 232°, then haul out northeastward for the Rade de la Hougue.

Tidal streams.—In the channel between the Iles St. Marcouf and the shore, the rate of the streams at springs is about 3 knots, their maximum rate being at about the time of half flood and half ebb in port de la Hougue. The direction of the flood through La Hougue Road is 232°; at the northern end of St. Marcouf Bank, 221°; round the Iles St. Marcouf, 187°; on the middle of the Cardonnet Bank, south; and, about a mile eastward of the end of that bank, 120°. In mid-channel, however, the flood stream runs nearly parallel with the shore from the Rade de la Hougue as far as the meridian of the Iles St. Marcouf; it then turns 187° toward the entrance of the Grand Vay, beyond which it again follows the direction of the shore. The ebb is rather weaker than the flood and at each position given runs nearly in an opposite direction. At neaps both streams are feeble except at the entrance of the Grand Vay.

Grand Vay.—The shore is flat and for the most part composed of sand hills from Port de la Hougue to the entrance of the Grand Vay, which is an indentation of the coast in the southwestern part of the Baie de la Seine; it is about 4 miles wide and 5 miles deep, and at its head are the small tidal harbors of Carentan and Isigny. The entrance to this deep bight is about 5 miles southward of the iles St. Marcouf; it is choked with sand and would probably cease to be navigable but for the extensive harbor works and the periodical freshets from the small rivers Taute and Douve on its western shore, and from the Vire and Aure on its eastern shore, whose channels afford sufficient depth for vessels of moderate draft to reach Isigny and Carentan at high tides. Formerly the tide flowed far into the interior, inundating the lowlands bordering the rivers. To remedy this dikes were constructed at the mouth of each river with flood gates at the upper ends of the harbors, which close with the rising tide. The church of Ste. Marie du Mont stands conspicuously 2.5 miles from the western shore, and the fine church spire at Maisy and the village and church of Grand Camp serve to mark clearly the eastern side of the entrance to the Grand Vay.

Buoyage.—The following buoys are moored at the entrance of the Grand Vay, and therefore lie in the approach to the Carentan and Isigny Channels: A bell buoy painted red and surmounted by a triangular topmark, 302°, 3.9 miles from Maisy church; a bell buoy painted in red and black horizontal bands and surmounted by a ball, 305°, 2.4 miles from Maisy church. Conical buoys painted black, surmounted by cylindrical topmarks and marked No. 1, No. 3, No. 5, are situated, respectively, 29°, 2.1 miles; 352°, 1.9 miles; and 328°, 2.1 miles, from Maisy church.

Magdeleine bank.—The entrance to the Grand Vay is more than half closed by the Magdeleine bank, which uncovers at low water 2.3 miles from the western shore, and is a continuation of the sandy strand, ½ mile wide, bordering the shore from Port de la Hougue southward. The highest parts of this bank are scarcely covered at high water, neaps, and it is considered the most dangerous of the Grand Vay banks, for the streams cross it with great rapidity and raise a heavy sea on a weather side. The sand also of which it is composed is so hard that a vessel grounding on it in bad weather would have but little chance.

The Banc de la Ravine is an extension of Brevand Point, dividing the lower courses of the rivers Taute and Vire. It extends as far northward as the parallel of Maisy Point, its summit barely covered at spring tides and the greater part of its surface dry during neaps. The greater part of the space between Maisy Point and this bank is occupied by shifting sands; that named the Feraillon, on the western side of the Isigny Channel, is the only one that does not change its surface, being covered with gravel, beneath which there is said to be solid rock.

There is little danger in grounding on the sands within the Grand Vay with smooth water during the dry summer season, for the tides then have but little strength, but during abundant rains or with equinoctial tides the ebb stream is very strong and heaps up the sand under vessels aground, causing them to list over and capsize.

Maisy Point, the eastern point of the Grand Vay, is very low, but defended against the heavy sea which sometimes rolls in by the Roches de Grand Camp, a ledge fronting the coast and extending 1.5 miles westward and 2.8 miles eastward of the point.

Buoys.—The Roches de Grand Camp are marked outside their outer edge by the three black conical buoys and the bell buoy painted in red and black horizontal bands.

Grand Camp Light.—From a white iron support situated 875 yards westward of Grand Camp Church is exhibited, at an elevation of 26 feet above high water, a fixed white light, visible 6 miles.

Capelle Road.—There is good anchorage off the entrance of the Grand Vay in Capelle Road, where in moderate weather vessels may remain until the tide has risen sufficiently to allow of their entering the narrows. This anchorage, about a mile in extent, is bounded westward by the line of Carentan Church tower in line with the eastern houses of Grand Vay hamlet, eastward by the rocky bottom which terminates in the direction of the small fort near the shore on Maisy spire bearing 170°, and northward by the highland of Mesnil, which rises eastward of Port-en-Bessin, in line with Percee Point; the latter mark also leads outside the rocky ledge and dangers off Grand Camp.

The best berth is with the end of Mesnil Cliffs in line with or a little open northward of Percee Point and the small fort open about 3° eastward of Maisy spire. At this anchorage the flood stream runs 187° and 198°, and it changes about half an hour before high water. The most favorable time for entering the narrows is about 1½ hours before high water, but with a head wind it is prudent to weigh in time to arrive abreast of Grouin Point, on the eastern shore of the Grand Vay, before the commencement of the ebb.

Carentan, on the river Taute, about 9 miles from the entrance and on the western side of the Grand Vay where the Vira and Taute Canal terminates, has a tidal harbor with a Bassin-à-flot or wet dock at its head. The Bassin-à-flot is entered by a lock 138 feet long, 39 feet wide, and with 13½ feet over the sill at high water, ordinary springs; it is nearly 1,600 yards in length and varies from 66 to 130 yards in width, its shores thickly planted with trees until near the town, at the upper end, where are 265 yards of substantial stone quay frontage. The quays communicate by well-paved roads with the railway station about 400 yards distant. From the entrance of the Bassin-à-flot dikes awash at high water neaps at all their outer part, like those of Isigny (the success of which led to the construction of these), extend no less than 2.5 miles, terminating abreast of the little village of Grand Vay. The width between these dikes is, at the entrance, 132 yards, narrowing to 71 yards near the upper end.

Depths.—The bottom of the channel is far above the level of low water, and the depth varies considerably, but practically the port is available for vessels of 13 feet draft at springs, but only for those of 7 or 8 feet at neaps.

Directions.—The Carentan Channel receives the waters of the Vire and Taute Canal as well as of the Rivers Taute and Douve, and its depth is only maintained by the extensive embankments assisted by the scour of these united streams. The North Carentan passage, called the Passee de la Magdeleine, having silted up at its outer part, is no longer used for ordinary navigation, and the buoys formerly marking it have been withdrawn. Vessels bound to Carentan should, therefore, until further notice make the Isigny bell buoy and then proceed through the east passage lying between the Magdeleine and Ravine Banks, leaving the buoys marking the former on the starboard hand. Hence, the Carentan Channel is well marked on either side up to the dike ends by numerous buoys, and the dike ends and the whole of their submersible parts are marked by beacons at short intervals, red buoys and beacons being left on the starboard hand in entering, black buoys and beacons on the port hand as usual. From the changeable character of the channel, both as regards direction and depth, and consequent alteration in position of the buoys, it is dangerous, under any circumstances, to attempt it without a pilot.

The town of Carentan contains about 3,000 inhabitants and is the center of a fertile grazing district; it was formerly a fortress, but its ramparts have been leveled and ditches filled in. It has a handsome church and spire, manufactures of lace and cotton goods, and a trade in cattle, horses, hemp, flax, butter, building materials, etc. Besides its coasting trade the chief traffic is with Southampton and with Norway and Sweden. It is on the direct Paris and Cherbourg railway, and therefore has ample means of communication with all parts of the country.

Lights.—Two fixed leading lights on wooden scaffoldings are exhibited to guide vessels through the channel of Carentan, viz, a red light on the sea bank near the inner end of the east backwater, elevated 16 feet above high water, and a white light at Brevand at the height of 49 feet; the white light is distant 790 yards 210° from the red light and is visible 6 miles, the red light being visible 8 miles. The lights show through an arc of 16° on either side of the leading line for the channel 210°, the intensity increasing as that line is approached.

Isigny, on the eastern side of and 6 miles distant from the entrance of the Grand Vay, has the benefit of direct railway communication; it stands on the River Aure which joins the Vire just below the town, both rivers being guided to the point of junction between dikes, and from thence in one channel in a 353° direction, also between rough stone dikes, their inner ends above the level of the highest tides and their outer parts awash at high water, neaps.

The eastern dike extends nearly 2 miles, the western dike being 275 yards shorter; they end nearly abreast of and about 200 yards from Grouin Point. The width between the dikes at the entrance is 102 yards, and it narrows to 92 yards at their inner end; their whole length is marked at short intervals by beacons, red on the starboard hand and black on the port hand, in entering. At the town the width between the quays is only 90 feet, except where a gare has been made for vessels to be turned round. There is an old stone quay 85 yards in length, as well as one of recent construction 220 yards in length; there are also two small unloading slips and others for building and repairing vessels. The staple of the town is butter, of which a large quantity is exported annually; also grain, colza oil, and stone. The population is about 3,000. The high road from Paris to Cherbourg passes through Isigny, as does also the railway from Grand Camp to Paris and Cherbourg.

Depths.—As at Carentan, the bottom of the channel is far above the low-water level. The harbor is available for vessels of 13 feet draft at springs and 7 or 8 feet at neaps; the berths alongside the quays are good. The depth is reported to have rather increased since the completion of the dikes and embankments, the silting up during the summer, when there is but little water in the Aure, being more than counterbalanced by the scour of the freshets occasioned periodically by heavy rains. Vessels may lighten, if necessary, during neaps at Grouin or Beuzeville before proceeding up to Isigny.

The Passe d'Isigny, between the western end of the Roches de Grand Camp and the Feraillon Bank, is the channel leading from the sea to the dike heads and thence to Isigny. It is wll markd by buoys and beacons as far as Grouin Point, from whence, as before stated, the submersible dikes between which the channel then lies are also marked by beacons at short intervals up to Isigny. The distance from abreast of the inner black buoy of the Roches de Grand Camp to the dike ends is about 2 miles.

Lights.—There are at Isigny two fixed white leading lights, bearing 353° and 173° from each other and 656 yards apart. They are elevated, respectively, 22 and 62 feet above high water, and visible in clear weather from the distance of 9 and 11 miles for 16° on either side of the leading line of the channel, the intensity of lights increasing as that line is approached. The lower (front) light is shown from a wooden gibbet at the point of junction of the Aure and Vire Rivers, the upper light from a white metal mast farther inland. The two lights in line 173° lead up the channel between the dikes.

Tides and tidal streams.—It is high water, full and change, at Isigny at 9h. 10m. Pilots estimate the depth by deducting 6¾ feet from the height of tide given in the "Annuaire des Marées à Cherbourg." The flood stream at springs loses its strength when the Grand Vay Banks are covered. It crosses the Magdeleine Bank with some rapidity until 3½ or 4 hours flood, and inclines toward the inner banks, which renders the entrance to the channel somewhat difficult with a head wind. The beginning of the ebb is weak, but as soon as the banks begin to uncover its rate rapidly increases. At Isigny both streams run strongly in the River Vire, but are scarcely perceptible in the River Aure.

The coast.—From Point Maisy, on the eastern side of the entrance to the Grand Vay, to Percee Point, the distance is 5.7 miles, the general trend of the coast being about 86°; a mile eastward of Grand Camp Church, the land suddenly rises and a perpendicular chalk cliff about 400 feet high commences, which may be seen from a distance of 12 or 15 miles. The land above the cliff is level and without any conspicuous object on it except the church of St. Pierre du Mont, which stands in the midst of a clump of high trees.

From Percee Point, Cape Manvieux bears 104° distant 11.5 miles, the little harbor of Port-en-Bessin lying between them; and, nearly as far as St. Come-de-Fresne Chapel, about 1.5 miles eastward of Cape Manvieux, the land as seen from the offing appears nearly a level plain upward of 400 feet above the sea, overtopped only by the church towers and groups of trees surrounding the villages. When nearer the coast, it presents a great variety of aspect; the chalk cliffs continue to about a mile southeastward of Percee Point, and, from thence as far as the guardhouse at St. Honorine, the high tableland recedes somewhat from the coast, the shore being low, sandy, and bounded by low sand hills, in front of which is a beach of muddy sand and shingle about 400 or 600 yards wide at low water. Between St. Honorine guardhouse and St. Come-de-Fresne Chapel, the shore is again precipitous, consisting of high cliffs of rock and brown clay intersected by narrow valleys, of which some are as deep as the level of highwater mark, but the greater part are only half the depth of the cliffs. Vessels of deep draft may approach to within a mile of the shore between Percee Point and Cape Manvieux without danger.

Eastward of the chapel of St. Come-de-Fresne, the appearance of the coast changes from cliffs of rock and brown clay to gracefully undulating hills, richly cultivated, and rising with a gentle slope behind the shore as far as the left bank of the River Orne. From Cape Manvieux to the Semaphore of St. Aubin-Bernieres near St. Aubin Point, a distance of 8.5 miles, the coast trends 94°; and, from thence, 114° 7 miles to the mouth of the Orne at Oyestreham. In the vicinity of Courseulles, the entrance to which is 1.7 miles westward of the Semaphore of St. Aubin-Bernieres, the coast again consists of low sand hills, except in front of the village of St. Aubin, where its direction begins to trend more southeastward.

The highest reefs of the Plateau de Calvados adjoin the shore along this coast line eastward of Cape Manvieux, rendering a near approach to it dangerous. The different localities may be recognized from seaward by the clumps of trees surrounding the villages and by the church towers appearing above them. Tailleville Hill, southeastward of Courseulles, is remarkable, as is also the hill at Amfreville on the eastern bank of the Orne, not far from the mouth of that river. Between the low-water rocks in front of most of the villages along the coast there exist small deposits of muddy sand and gravel, called Anneaux, which afford no shelter with northerly winds, but where, at the commencement of the fine season, the villagers fit out large fishing boats of from 8 to 10 feet draft, when laden. During the winter these boats remain either at Courseulles or in the Orne. Beween St. Aubin Point and the River Orne, as far as Lyon, the coast is rather high; in other parts it consists chiefly of sand hills.

Grand Camp is a little village on the shore between Maisy Point and Cricqueville and is backed by a low hill; its position is marked at night by the small fixed white light. It has railway communication with Isigny and is an important fishing station; its people, principally fishermen and sailors, fit out 30 or 40 good-sized fishing boats, which lie under the lee of a small breakwater of rough stones, or moored to buoys on a small sandy strand, dry throughout at low water, springs, and protected from the high sea with on-shore winds by the Grand Camp rocks. Some of the pilots for the Grand Vay reside in this village and others at Isigny.

A lifeboat is stationed at Grand Camp.

Percée Point is the northeastern point of the high chalk cliffs which border the shore from about a mile eastward of Grand Camp to a mile southeastward of Percée Point. The point projects but little and is remarkable only from the change in the direction of the coast line. A flat of sand and gravel, divided into several parallel banks, extends about 1,600 yards 97° from the point; the eddies occasioned by these banks, which lie across the tidal streams, cause a slight race on a weather tide, but it is not dangerous to decked vessels.

Semaphore.—There is a semaphore station on Percée Point.

Port-en-Bessin is 7 miles 111° of Percée Point; it is situated at the opening of one of the most considerable of the valleys which intersect the high cliffs of rock and brown clay on this part of the coast. The opening is about 130 yards wide between the Cliff of Huppain on the west and of Castel on the east. Within the opening the valley suddenly widens and forms a circular plain more than a mile in diameter, of which the level is from 15 to 20 feet above high water; it is almost entirely surrounded by gently sloping hills.

Depths, etc.—Fronting the valley is a steep gravel beach, which when the sea is smooth affords a good grounding place for fishing boats; and fronting the beach is a break in the rocks which border the shore, forming a natural basin, 140 yards wide and 400 yards long, with sand and gravel bottom, dry at low water, but having 21 feet in it at high water, springs, and 18 feet at neaps. Between 1845 and 1860, a sum of $5,000,000 was expended in the attempt to transform this small natural basin into a harbor of refuge. Two massive moles, their bases 550 yards apart, extend from the shore, their ends curving toward each other and leaving an opening about 110 yards wide, with 27 feet water in the entrance at high water, springs, and 24 feet at neaps. The western mole is 500 yards in length, the eastern mole 35 yards less. Several mooring buoys are laid down within this space, but with northerly winds in weather when a vessel would require refuge, the sea is so high and the surf so great that it would not only be most dangerous to run for this harbor, but very unsafe for any vessel already in it.

The village of Bessin has a population of about 1,200; it is connected with the city of Bayeux, about 6 miles distant by road, and through it with the general railway system. It has a large fishery, but its coasting and other trade is insignificant; a few small vessels of about 150 tons arrive annually during the fine season with coal from England and timber from the Baltic, and sail again in ballast. At low water abundant springs of fresh water issue from apertures in the rocks which dry at that time.

A lifeboat is stationed at Port-en-Bessin.

Leading lights.—A fixed white light (front), visible 6 miles, is shown from a white wooden shed under the western cliff of Port-en-Bessin at an elevation of 82 feet above high water.

Another fixed light (rear), elevated 139 feet above high water, is exhibited from the window of a dwelling 94 yards 203° from the lower light; the lights in line lead into the harbor. The rear light serves as a tidal light, changing from red to white and white to red, according to the condition of the tide. It is visible 8 miles as a red light and 11 miles as a white light. Both lghts are visible 16° on each side of the leading line, their brightness increasing as that line is approached.

Tides.—It is high water, full and change, at Port-en-Bessin at 8h. 57m.; ordinary springs rise 20 feet, neaps 15½ feet.

Semaphore.—There is a semaphore station on the cliff just westward of Port-en-Bessin.

Arromanches, a pretty little fishing village used as a watering-place by the inhabitants of Bayeux, stands on the seashore at the entrance of a wide valley ¾ mile eastward of Cape **Manvieux**; and as it is very conspicuous from seaward it serves to point out the position of that cape, which otherwise has little to distinguish it but its height and the steep cliff in which it terminates. The villagers fit out small half-decked fishing vessels which, by means of capstans, they heave up a shingle beach much resembling that at Port-en-Bessin. A rocky shore which uncovers nearly ½ mile seaward at low water and forms a point advancing in an easterly direction from Cape Manvieux, arrests the sea during northerly winds, and diminishes the violence of the surf on the beach, which is otherwise very exposed.

Plateau de Calvados.—This rocky flat commences just eastward of Arromanches and extends 13 miles eastward along the coast as far as Lyon. The parts of the flat which uncover are the Calvados Rock, from which the name of the flat is derived, the Roches de Ver, the Essarts de Langrune, and the Roches de Lyon. A tradition exists that a forest of chestnut trees, called the Forest of Hautereuille, originally covered the rocks, which dry at low water, between Bernières and Lyon, and that its destruction took place about 300 years since. Roots of chestnut trees are said to be found in the fissures of these rocks, and they are so difficult to extract and the wood so hard that it blunts the best tools.

Calvados Rock is 1 mile from the shore, its northwestern edge bearing 1° 1.3 miles from St. Côme-de-Fresne Chapel. It is about ½ mile long west by north and east by south and 600 yards wide; its western part is highest and uncovers 5 feet above the lowest tides. The chapel in line with the spire of Bazanville Church, which stands on the top of the hills 2 miles inland, bearing south, leads 600 yards westward.

The northwestern angle of the Plateau de Calvados bears 41° 1 mile from the western edge of the Calvados Rock; it is steep-to, and from this point preserves a distance of from 1.5 to 2.3 miles from the shore as far as Essarts Point, the northeastern extreme of the flat, which lies 400 yards westward of the line of Langrune and Douvres Church spires in one bearing 193°, with Ver Lighthouse bearing west, and Oyestreham semaphore, at the entrance of the River Orne, 136°. From Essarts Point, which is 2.3 miles from the shore, the edge of the flat turns sharply southward, and, approaching the coast within a mile, continues at that distance until it is lost beneath the drying sands westward of the mouth of the River Orne. Essarts Point is the most dangerous part of the plateau, having on it only 4 feet water and rising suddenly from a depth of 20 feet, with 6 fathoms close-to outside northward and eastward; it occasions a change in the direction of the tidal streams and causes a race during springs on a weather tide. There is but little water on all parts of the flat, and, the rocks being uneven, a heavy sea breaks on them with strong northerly winds.

Buoys.—A black spindle buoy with cylindrical top mark is moored about 1 mile 311° from the northwestern angle of the Plateau de Calvados and 1.3 miles 350° from the western edge of the Calvados Rock.

A red buoy is moored in a depth of 7 fathoms 32° 1,700 yards from Essarts Point, with Langrune and Douvres spires in line, and the outer black buoy at the entrance of the Oyestreham Channel 134° distant 6 miles.

Caution.—These buoys being in exposed positions, are very liable to drift, and the mariner therefore should be on his guard.

Anchorage.—A small anchorage with good holding ground, named the Fosse d'Espagne, lies midway between Arromanches and the Calvados Rock, in a small elbow formed by the steep western side of the Calvados Flat. The best position in which to anchor is in about 20 feet water, with Crepon Church tower seen between those of Mevaisnes and Asnelles, and the tall spire of Bernieres on with the houses of Ver Hamlet nearest to Ver Lighthouse; this anchorage is exposed to all but offshore or moderate easterly winds.

The soundings deepen rather suddenly outside the Calvados Flat, but there is no good anchorage ground at less than a mile from its deep western edge or than 2 miles from its eastern edge.

Directions.—Vessels of deep draft may approach to within about a mile of the shore, even at low water, between Percee Point and Cape Manvieux, but it is imprudent to stand in so near with northerly winds. Coasters keeping close in, with offshore winds, should be on their guard against the gusts which proceed from the valleys. Good holding ground may be found at a distance of 2 or 3 miles from the shore in a depth of 9 or 10 fathoms, where vessels sometimes anchor to await the turn of tide. The tidal streams follow nearly the direction of the coast, and their greatest strength at springs does not exceed 3½ knots.

In approaching Essarts Point of the Calvados Flat from the eastward keep northward of the line of Ver Church tower on with the Bois des Epines bearing 250° until Langrune and Douvres spires are in line 193°. The Bois des Epines consists of a few large elms, is very conspicuous, and being used as a landmark is carefully preserved by the local authorities. It is nearly a ¼ mile inland, at the foot of the hills between Ver Lighthouse and the Chateau de Vaux. In rounding Essarts Point from the eastward keep Lyon Church tower open westward of the western house of St. Aubin-d'Arquenay village, bearing about south, until the line of Langrune and Douvres spires in one is crossed.

Light.—**Pointe de Ver** Lighthouse stands 700 yards inland on the slope of a small hill 4.7 miles eastward of cape Manvieux and 10.8 miles westward of the entrance to the river Orne; it is a square tower with basement, from which is exhibited, at an elevation of 138 feet above high water, a group flashing white light. The light is visible 18 miles. See Light List for details.

By day Ver Lighthouse may be easily recognized in approaching it from eastward or westward, but from the northward it is difficult to distinguish on account of the high land behind it. The light was established to give warning of approach to the Calvados Flat, but with southerly winds it is very useful to vessels from the westward bound to Havre, who after passing Cape Barfleur sight this light, if possible, 9 or 12 miles distant, and from thence steer for the lights on Cape de la Heve, which are then soon made. By this means they avoid making the land too far northward of Havre and the consequent delay in entering their port.

Courseulles.—This small tidal harbor, 2.5 miles eastward of Ver Lighthouse and 8.5 miles westward of Oyestreham near the entrance of the river Orne, is in fact the channel through which the waters of the river Seulle are conducted, intercepted by a dam which forms the head of the inner harbor or Bassin-a-flot, in which they are retained or discharged at pleasure by means of sluices into the outer harbor, and from thence through the channel to sea. The entrance channel is above the low-water level and lies between two wooden jetties running nearly parallel with each other; the western jetty is 196 yards in length, the eastern jetty not quite so long. The width between them is only 122 feet at their outer end and 90 feet at their inner end.

The sand bank on the western side of the entrance channel is awash at high water, neaps, and prevents access to the western jetty head, except by the channel itself. It is, however, very steep toward the channel, so that if a vessel grounds upon it in entering she has no difficulty in hauling off again with a rising tide.

A low stone dike extends 325 yards from the eastern jetty head in the same direction as the jetty; it serves to confine the stream and thus to maintain the direction and depth of the channel. This dike covers at 12 feet rise; it is marked at its end by a wooden beacon, painted black and surmounted by a cylindrical top mark, by a broom beacon, 82 yards beyond the end, and by a white buoy, on the dike, about 140 yards from the jetty head. A white buoy moored 70 yards from the western jetty head marks the western side of the channel, in which is a warping buoy for the use of vessels entering or leaving.

A buoy, painted black, with cylindrical top mark, marks the southwest edge of a 1-foot patch, situated 300 yards southwestward of the Marguerite Rock.

Depths.—The depth in the fairway between the piers at Courseulles at high water springs is 14¾ feet, and about 10¾ feet at neaps, there being about 1 foot less water in the channel outside; within the jetty heads it varies and is subject to temporary accumulations of sand, but in ordinary weather, at springs, the harbor admits 12 feet draft, and from two hours before until three hours after high water a least depth of 8 feet in the channel may be depended on. At the inner end of the jetties is the outer harbor, a mere widening of the channel between rough stone embankments, with numerous sets of berthing piles and extensive quays, averaging 60 feet in width. The outer harbor is 635 yards long, with a maximum width of only 49 yards. At its head is the entrance to the inner harbor or bassin-a-flot, which is by a single pair of floodgates, with a depth over the sill of 10½ feet at high water springs and a width of 34 feet. Its length is 320 yards and width 61 yards; on its western side a careening slip occupies a space of 153 yards. The depth in the bassin-a-flot is about 14½ feet at high water springs and is lowered to about 10 feet at low water by the sluices before mentioned. It also has ample quay accommodations of very solid construction.

Courseulles has the advantage of direct railway communication with Caen through the little town of Luc, a thriving watering place between Courseulles and Ouistreham, and from thence with the general system of France. Its trade, however, with the exception of a rather extensive fishery, is small, its imports being coal and Baltic timber and its exports nil. The total annual tonnage entering the port, including a few small steamers, is about 28,000 tons.

Lights—West Jetty.—A fixed white light, visible 6 miles, is exhibited at an elevation of 30 feet above high water from a wooden gibbet 21 feet high on Courseulles western jetty head; it is, however, said to be frequently hidden by fog and mist.

East Jetty.—A fixed green light, elevated 25 feet above high water and visible 4 miles, is exhibited from a lamp-post, with shed on the eastern jetty head.

Tides.—It is high water, full and change, at Courseulles at 9h. 7m.; ordinary springs rise 19 feet, neaps 15 feet, or about 3¼ feet more above the level of the soundings.

Directions.—Tailleville hill and trees, the fine spire at Bernières, and Ver Lighthouse, are all excellent objects by which the position of Courseulles may be determined from a distance. Vessels should remain outside the Plateau de Calvados or in the anchorage of the Fosse de Courseulles until half an hour or three-quarters of an hour before high water, as, from the offing, they will then be able to steer direct for the entrance channel, and will have nothing to fear from the Marguerite or Germain Rocks. If the wind should be off the land, half an hour longer may be required for warping in. For the deepest water, with a heavy sea, vessels may run for the harbor either between the Germain Rock, which uncovers 4 feet, and the Essarts de Bernieres, or between the Ver Rocks and the Germain. Banville Church tower in line with Courseulles West Jetty light structure, 222°, leads to the harbor entrance by the first passage; Beny Spire in line with the small church tower at Courseulles 156° by the second, this latter line leading a little westward of the Valette Rock on which the sea breaks.

In running for the harbor from the western side, however, it is better to pass eastward of the Valette Rock by bringing Beny Spire in line with a little mound on which there is a small battery a cable eastward of the eastern jetty, bearing 162°. This leads directly toward a black buoy with cylindrical top mark moored on the southwest edge of the 1-foot patch about 300 yards southwestward of the Marguerite Rock, which rock is awash at low water, and with another small rock almost awash and 100 yards westward of it marks the southwestern extreme of the shelf of rock separating the Fosse de Courseulles from the Anneau de la Marguerite.

Anchorage.—In ordinary weather, small vessels may find safe anchorage either in the Anneau de la Marguerite in about 16 feet or in the Fosse de Courseulles in from 2½ to 3½ fathoms, good holding ground. Vessels unable to enter Courseulles Harbor against a strong ebb tide may also in fine weather safely ground in the channel and await the next tide.

Semaphore.—The semaphore station of St. Aubin-Bernières is 1.5 miles eastward of Courseulles Jetties.

Orne River.—The River Orne has its source near Seez, and from thence it trends in a northwesterly direction until it enters the department of Calvados, where it turns to 356° in passing Caen; here it becomes navigable and 9 miles below that town finds its way into the sea between the sandhills of Siege and Merville Points, nearly 10 miles eastward of Courseulles and more than a mile eastward of Ouistreham church. At low water the river formerly ran by winding channels through the wide expanse of sand which dries 2 miles out from the shore at the entrance. To obtain a greater depth of water a submersible dike marked by beacons was constructed, commencing just inside Merville Point and extending more than a mile in a northwesterly direction outside Siege Point to a position about 300 yards northeastward of the pierheads of Ouistreham, and from thence a farther distance of nearly 1,600 yards, 1°, thus confining the stream to one channel, which, turning sharply round Siege Point, flows between the land and the dike for its whole length northwestward, and then to the sea in front of Ouistreham. This channel, therefore, forms the entrance to Ouistreham and also to the River Orne itself; but since the construction of the canal from Ouistreham to Caen the navigation by the river to that city, except by the small Havre passenger steamers, has been entirely abandoned and needs no further notice, though vessels of 8 or 9 feet draft may still use it.

The sand banks off the entrance are shifting and change their height, shape, and position almost every tide, rendering it most imprudent to venture in without a pilot, for to ground on them would almost always involve the loss of the vessel. The parts least subject to change are those near low water mark; they are always covered during neaps and only uncover a short time at springs. The banks formed on this part of the shore are named by the pilots battures, and, with strong northerly winds, there is a heavy sea on them on the flood and breakers on the ebb. The Oiseaux—the high banks on the western side of the entrance—have a decided tendency to extend eastward, thus slowly forcing the entrance channel in that direction.

Caen is 9 miles from the sea by the river, and 7.5 miles by the canal; it is at the confluence of the Rivers Orne and Odon, is on the Paris and Cherbourg Railway, and is a place of great importance, with an increasing trade, and a population of about 44,794. It may be considered a double port, having its wet dock or Bassin-a-flot entered by the Oyestreham Canal, and its natural tidal grounding harbor in the bed of the River Orne, which also has an entrance into the Bassin-a-flot, and some quay frontage but little used now. The Bassin-a-flot is rectangular, is entered from the canal by a lock 40 feet wide at the gates, is 630 yards in length by 59 yards in width, and has a general depth of 14½ feet. It has good quays, steam cranes, and two careening slips for small vessels, but no dry dock. It communicates with an inner basin with 1,350 yards of quays, on which rails are laid, and vessels unload direct into railway trucks.

The Canal de Caen is entered from Oyestreham harbor by a lock (*see* particulars below), at high water, and is about 7.5 miles in length to the lock at Caen. It has a uniform central depth, maintained by dredging, of 16½ feet; it is crossed by three swing bridges, and its available width for navigation is limited by the narrowest bridge opening, which is 49⅝ feet wide.

The regulations for the navigation of the canal prescribe that vessels leaving Caen for the sea shall, whenever necessary, moor to allow those arriving to pass freely.

Supplies.—**Coal** may be obtained with facility, though it is not often required, about 3,000 tons being usually in stock. There is, however, a deficiency of general supplies for shipping, and also of store accommodation, considering the growing trade of the port.

Repairs—Hospital.—Facilities for repairs of machinery are very limited. The hospital of the Hotel Dieu is open to sailors in case of illness or accident, a small fee only being required.

The imports are chiefly coal and timber; the exports, iron ore, colza oil cake, eggs, butter, fruit, barley, potatoes, etc.

Oyestreham Harbor.—This harbor, which forms the entrance to the Canal de Caen, consists of a basin with stone quays on either side 300 yards eastward of Oyestreham Battery, communicating directly by means of the canal, already described, with the port of Caen; and for the passage through this canal, the services of a tug are always obtainable at Oyestreham. The basin is 320 yards long and 100 yards wide, but the bottom is hard and uneven and can not be recommended as a place for grounding. At its head is a lock in two parts, each 59 feet wide, separated by double gates, the lower being 230 feet and the upper 295 feet in length. The depth on the outer sill at low water springs is 8 feet. Through this lock vessels bound for Caen enter the canal at high water.

The basin is entered from seaward by a channel 44 yards wide, between two wooden jetties of unequal length, opening into a wider outer channel between submersible dikes. The western jetty extends from the basin over 500 yards, and is thence prolonged seaward in a 359° direction a farther distance of 1,500 yards by a submersible dike running nearly parallel with that forming the eastern side of the channel, the width of the channel at their outer ends being about 250 yards and at their inner ends only about 200 yards. Both dikes are marked by beacons at their outer ends and by others at intervals to show their position when covered. A sand bank drying 20 feet has formed at the extremity of the western jetty, which juts out about 20 yards from it in the vicinity of the green light. The jetty on the right bank has been extended 220 yards; a further prolongation by another 420 yards will, it is hoped, be completed by 1916. From the termination of the submersible dikes to the edge of the sands the channel has a constant tendency to move eastward, so that, by latest information, the deepest water up to the entrance was in a 52° direction from the outer ends of these dikes.

By damming the River Orne the depth of the water in the canal has been raised to about 20 feet.

The work of widening the canal to about 71 feet and deepening it to 23 feet will (1914) shortly be undertaken.

The lock gates are worked for over two hours before to after high water.

Two electric cranes of 3¼ tons and one of 25 tons are available.

Depths.—The entrance channel is very liable to change both in depth and direction, but vessels of 17 feet draft can generally enter. Dredging has been carried out in the channel (so increasing its width) and in the harbor itself. Vessels drawing 14 or 15 feet can proceed through the lock and canal to Caen, as already described.

Buoyage.—A red and black spindle buoy is moored in a depth of 3½ fathoms, outside the edge of the sands, 4° 1.6 miles from the western jetty head.

Three buoys lie in line, about 300 yards apart, in a 24° direction from the outer extreme of the western dike; the outer buoy black with cylindrical top mark and the other buoys red with triangular top marks. A black buoy, also, is moored between the dikes, distant 900 yards from the end of the east jetty. Other buoys are placed and moved as may be necessary in consequence of the shifting nature of the sands in the channel leading into Oyestreham Harbor.

Pilots.—There are several pilots at Oyestreham; they may always be found in the neighborhood of the outer red and black spindle buoy and will meet a vessel much farther out if the pilot signal is made.

Semaphore.—There is a semaphore station at Oyestreham near the shore 800 yards westward of the jetties; it is among the sand hills and not easily made out.

Tides.—It is high water, full and change, in Oyestreham Harbor at 9h. 59m.; springs rise 22¼ feet, neaps 18¼ feet above the datum of the soundings, which are charted about 3¼ feet below the level of low water, ordinary springs; ordinary springs range 19 feet, neaps 11 feet. With strong westerly winds for several successive days the water falls less and rises higher; with easterly winds, the contrary is the case.

A lifeboat is stationed at Oyestreham.

Lights—Oyestreham.—An occulting white light, with a red sector, visible 16 miles, is exhibited at an elevation of 124 feet above high water, from a white cylindrical tower 116 feet in height, situated on the eastern side of the lock entrance to the Canal de Caen.

East jetty.—A fixed red light, elevated 21 feet above high water, visible 4 miles, is shown from a wooden shed at the outer end of the eastern jetty.

West jetty.—A small fixed green light, visible 4 miles, is exhibited from a movable white wooden frame at the western jetty head.

Two small fixed lights mark the entrance to the lock, which show red when the gates are open and white when they are closed.

Fog bell.—A bell is sounded by hand, in foggy weather, upon the western jetty.

Oyestreham approach—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the Port of Oyestreham are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the west by the alignment of Oyestreham Lighthouse and the semaphore; on the east by the alignment of Sallenelles steeple and Merville redoubt; on the north by the arc of a circle drawn with Oyestreham Lighthouse as center, with a radius of 3.5 miles. The above limits have not been placed on the chart plates.

Directions.—The most favorable winds for entering Oyestreham Harbor are those from northwest by west round by north to east by south. When they are moderate the sea is not heavy on the banks, but it must be borne in mind that, with sufficient water for entering, the tide is always running eastward; however, between the dikes and jetties it is slack water, or nearly so, from half an hour before to an hour after high water, so that with a good pilot and the wind anywhere between the points indicated a sailing vessel may enter the harbor by day or night without the aid of a tug, leaving black buoys on the port hand and red buoys on the starboard hand.

The fixed red light on the east jetty in line with the main light (fixed white) on the eastern side of the lock 184° leads between the breakwaters and up the center of channel to Oyestreham Harbor.

Rade de Caen, about 2.5 miles distant between 1° and 333° from Ouistreham jetties, affords good anchorage in depths of from 4 to 5½ fathoms, with offshore winds, for vessels waiting tide to enter the harbor, but it would be dangerous to be caught there by strong winds from the opposite direction.

The eastern limit of the road is the meridian of Oyestreham Lighthouse, its northern limit Bernieres spire in line with the houses on St. Aubin Point, and it southern limit Bernieres spire in line with the small church tower at St. Aubin. Pilots usually place large vessels between these limits in a depth of about 5½ fathoms, with Luc Church tower open 6° southward of Beny spire; here they can weigh and stand offshore if the wind should veer to the northward.

The River Dives—Depths.—The entrance to this river is about 6.5 miles eastward of Oyestreham, the intermediate coast consisting of sand hills or dunes, several of which are sufficiently high to be recognized when 5 or 6 miles distant. A sandy strand ½ mile wide at low water borders the shore, and the waters of the Dives run out across it, but in front of the entrance it now dries for about a mile. Attempts have been made, with partial success, by means of a submersible dike, to confine and deepen the channel, which trends 350° about ½ mile from the entrance and then inclines more easterly as far as the outer edge of the sand. In fine weather and with no swell the river admits vessels of 11 or 12 feet draft at springs and 7 feet at neaps; the shoalest part of the entrance channel is about 7 feet above the level of the lowest tides, but with much fresh water in the river it becomes temporarily deeper.

At the outer edge of the sand the water deepens abruptly, and with strong winds between north and south this causes a heavy sea at the entrance on the flood and breakers as soon as the ebb stream begins to gain strength.

The grounding places within the entrance are well sheltered by Cabourg Point. Vessels here are safe, but the bottom is hard and unyielding. Those that only remain one tide are placed on the left bank of the river; vessels that take in or discharge cargo are berthed alongside a small quay or near the steep bank of the Mauvais-Pas at the foot of the Balise de Dives, a hillock near the entrance.

The little harbor of Dives is by nature much better calculated to make a really good harbor than any of those previously described in the Baie de la Seine. It has also railway connection eastward and with the interior, but its trade is entirely unimportant and declining. It is remarkable as being the port from which William the Conqueror embarked with his army for the conquest of England.

Buoys and beacons.—A wooden beacon with top mark, and four buoys, two red and two black, mark the entrance channel; the beacon is on the western edge of the passage close to the foot of Cabourg Point. The buoys are shifted whenever the course of the channel undergoes any decided alteration.

There are, in addition, two beacons surmounted by disks on the shore which act as leading marks by day, as the lights do by night. The lower leading beacon is colored red, black, and white; and is close to the tower of the high light. The high leading beacon is on the slope of Beuzeval Hill and is black. The lower beacon is movable, to suit the line of direction (at present 167°) to the changes of the channel.

Lights.—Two fixed red lights, 195 yards apart, visible through an arc of 16° on either side of the leading line, increasing in power as that line is approached, are exhibited on the eastern side of the mouth of the River Dives; when in line, bearing 167°, they mark the fairway into the channel. The lower light, 10 feet above high water and visible 8 miles, is only shown when there is more than 3 feet water in the channel; it is moved as the channel shifts. The upper light shown from a white stone watch house 26 feet high at an elevation of 148 feet above high water is visible 9 miles.

Directions.—Northerly winds are the best for entering the River Dives, but it is necessary to wait for high water whatever the vessel's draft, except at springs, when, with a smooth sea, small vessels may enter an hour after high water if there is wind enough to stem the tide. With offshore winds the entrance should only be attempted by small vessels, and they should be prepared for the heavy gusts coming down from the highland through the valleys.

The pilots have no good boats for boarding vessels outside the entrance in bad weather. A vessel, therefore, compelled to enter the river with a strong northerly wind must contrive to be about 1.5 miles from the shore on the meridian of the Balise de Dives at high water. From thence, bring the leading beacons in line and steer in, leaving the buoys and the beacon on the starboard hand, and the two black buoys on the port hand; when near the beacon, a pilot will be met with to conduct her to a berth.

Anchorage.—There is good anchorage off the entrance to the Dives, 1.5 or 2 miles from the shore, where, in fine weather, a vessel may remain until there is sufficient water in the channel. With a turning wind into the river, it is necessary to anchor in order to retain a favorable position; for the velocity of the flood stream is here considerably increased by the indraft of the River Seine, and a vessel remaining under sail would be drifted to leeward of the entrance. No vessel should, however, remain at anchor unless the weather continues fine and the wind is offshore; should it come from seaward, with no certainty of entering the river at high water, it is necessary to weigh without delay and seek refuge either at Havre or Honfleur.

Tides.—It is high water, full and change, at the entrance of the River Dives at 9h. 39m.; springs rise 21 feet, neaps 16 feet; but in the shoalest part of the channel, where the bottom is 7 feet above the level of the lowest tides, the water rises about 18½ feet at equinoctial springs 16½ feet at ordinary springs, and 7½ feet at neaps.

Semaphore.—There is a semaphore station on the summit of Beuzeval Point, about 1 mile eastward of the entrance of the River Dives.

The Seine—estuary and river.—The low coast from the River Orne, consisting of sand hills, terminates with the left bank of the River Dives, and the land suddenly rises upon its opposite bank. Beuzeval Hill, which commands the entrance to the Dives, and Cape de la Heve, which bears 24° 13.5 miles from Beuzeval Point, are the most western of the high lands between which lies the estuary of the Seine. An imaginary line drawn from Beuzeval Point to Cape de la Heve may be considered the boundary between the sea and river navigation, and approximately, the western limit of the accumulation of sand and mud, forming dangerous shoals in the estuary; no vessel should approach this limit, unless bound to some port of the Seine, and it is in the neighborhood of this limit that the indraft of the river begins to gain strength with the rising tide.

Depths, etc.—From this outer limit of the estuary to the commencement of the artificial stone embankment of the River Seine abreast of Berville the distance is only 13 or 14 miles, and from thence, following the sinuosities of the river, it is about 58 miles to Rouen. At the entrance between the embankments, the width is about 760 yards. At Tancarville, 4½ miles higher, where the canal from Havre opens into the river, it is 515 yards wide, and its width continues to diminish until at Rouen it is only 165 yards wide. In the outer part of the southern channel, between the sand banks, the depth is only 3 or 4 feet water at the lowest tides, and from 26 feet at high water springs, to 21 or 22 feet at ordinary neaps. Within the embankments, at no part in the best water is there less than 10 feet at the lowest tides, while at many parts it is sufficiently deep to afford anchorage where large ships may remain afloat. At high water, the range of tide decreasing within the river, the least depth varies from 16 feet 10 inches at the slackest neaps to 24 feet 8 inches at springs. Vessels of 19 feet draft can ascend to Rouen at high water neap tides, and of 25 feet draft at high water springs. Vessels drawing 8½ feet can, under certain conditions, reach Paris. From Tancarville upward, the whole of the land has been reclaimed up to the embankments. Below that place a considerable tract is overflowed at high water.

It may be here mentioned that the great engineering improvements effected during the last 50 years have no appearance of finality. In March, 1895, a law was passed under which financial arrangements were made for the following vast works: As regards the navigation to Rouen, the proposed improvements include the repairs of present embankments and removal of shoals, the extension of the embankments as far as Honfleur, the works necessary to maintain at Honfleur an entrance to the Seine equal in depth to that river, works necessary to insure the navigation of the Rille up to Audemar, and all necessary dredgings. As regards Havre, the proposed improvements are now in an advanced condition, and the works will be included in the description of that port.

Quillebœuf.—The depth of water at Quillebœuf is only sufficient to allow barges alongside at high water, and so it is out of the question for big ships.

La Bouille.—There is a quay here which would allow ships of 17 to 18 feet draft to go alongside at any state of the tide.

Duclair.—There is a solid wooden wharf here, 490 feet long, with a least depth alongside of 21 feet.

Banks.—The principal banks in the estuary and obstructing the mouth of the Seine are the Trouville, the Ratier, the Amfard, the Hauts de la Rade, and the Eclat, the higher parts of some of which uncover at low water; the two first are near the southern shore, the Amfard in the center, and the two last near the northern shore between Havre and Cape de la Heve. The banks and channels at the mouth of the estuary of the Seine are subject to frequent and great changes, and the buoys are shifted accordingly.

The Amfard and Ratier Banks divide the mouth of the Seine into three channels, two of which, at low water, are blind channels abutting on the shifting sands, then uncovered, within the estuary. The southern channel, the deepest, is that which leads to and beyond Honfleur, and thence up the main stream of the Seine to Rouen, etc.; the northern channel leads to and above Havre on the northern shore; and the central channel, which can only be used when there is sufficient water for vessels to cross the flat eastward of Ratier Bank. The entrance to the Seine through these channels should not be attempted without a pilot. In these channels the stream runs 7 or 8 knots at springs and 4 or 5 knots at neaps, and vessels of deep draft should avoid approaching the outer banks during the flood, for if once they should be carried amongst these sands and ground on them they would certainly be lost, for anchors will not hold in the shifting sands, and the violence of the stream, increasing in velocity as it advances eastward, is irresistible.

There are 67 pilots available at Havre for the estuary, and 35 at Villequieur, where the river pilots take on.

Vessels are exposed to great danger and, indeed, are forbidden to attempt the central channel without the assistance of the pilots of Quillebœuf, who are specially appointed to conduct vessels above Havre and Honfleur. It is the duty of these pilots to watch the changes in the position of the banks and to mark the actual direction of the channels by beacons. Their principal stations are at Havre and Honfleur, where they are always in sufficient number to meet the requirements of navigation. At either of these places sailing vessels bound up the Seine can also procure tugs, which are generally used to insure a speedy passage past the dangers of the lower Seine.

Tidal streams.—To comprehend the unusual tidal conditions of the River Seine the nature of the offing streams in the vicinity must be taken into consideration. The general channel flood stream, sharply compressed between the head of the Cotentin Peninsula and the English coast, again expands eastward of the meridian of Barfleur, taking four principal directions; one portion follows the English coast, another strikes the coast of France between Dieppe and Cape Gris Nez, a third runs in the direction of Cape d'Antifer, and a fourth flows around the shores of the Baie de la Seine. It is the last two with which we are now concerned.

Of that portion which strikes the coast in the neighborhood of Cape d'Antifer, one part takes a southerly direction, meets and unites with the coast stream from the westward off the entrance of the Seine, and thus causes the tide to rise very rapidly in the first part of the flood. This, in conjunction with the form of the estuary and of its sand and mud banks, is probably the primary cause of the phenomenon known as the Bore, Mascaret, or Barre, which will now be described.

The Bore.—The flood makes in the Seine at the hours anticipated, but under very different aspects, dependent both on the state of the tides (neaps or springs), and also on the seasons. The replacement of the ebb by the flood is thus a complex phenomenon. The general result is that in weak neap tides the ascending stream replaces the descending stream without any apparent effort and so easily that an observer may remain in doubt as to the precise moment of the change; in mean tides, the reversal of the stream, shown by a gentle undulation of the waters throughout the whole breadth of the river, seems to be immediate; and in spring tides the flood rushes in suddenly accompanied by an agitation more or less turbulent and at times so considerable as to be a real source of danger. The establishment of the flood under these extraordinarily violent conditions is named the Bore or by the French Mascaret or Barre. It occurs almost invariably every spring tide and is especially strong about the equinoxes or with high spring tides from any cause; it is highest with easterly winds and lowest with those from the westward, and as the wave frequently breaks in shoal water small decked craft unable to avoid it should be battened down or they will inevitably be swamped.

Let us suppose that this phenomenon is about to occur: An observer stationed at Rille Lighthouse a few minutes before low-water springs and looking toward the estuary would see the bay laid dry as far as the eye could reach, except where the river, flowing in the direction of Honfleur, covered a breadth of some hundred yards between banks of muddy sand.

The ebb stream is still running from 2 to 3 knots, but its speed slackens suddenly and at the same time a slight surf is seen at a distance against the outline of the banks; its noise is heard and the water invades the uncovered places very rapidly. An irregular swell (for it subsides here and there) ascends the channel, inclining each buoy in succession and marking the course of the flood stream which has thus suddenly set in. It penetrates the embanked part of the river. Its triple or quadruple undulation becomes immediately more marked, the level rises visibly, the north dike is fringed with foam. A moment after, on its passage to La Roque and afterwards to Radicatel, waves break, especially near the right bank. Along the left bank there is scarcely any agitation. The boats of Tancarville and Quillebœuf may be seen resting on their oars, bows on to the approaching swell; they rise to it, turn about when it has passed, and ascend with the stream; in this manner boats in that part of the river take the flood; without that precaution they would be capsized.

From Quillebœuf, looking in the direction of Radicatel, the river is broken water right across (hence the name of Barre given by the riverside population to the Bore or Mascaret), the water breaking much more heavily against the right bank than the other, doubtless on account of the bend, as the waves rush upon it obliquely and cover the platform of the dike with their spray. The mass of water reaches Quillebœuf before the agitation of which we speak is at an end at Rille, and it lasts some minutes longer, calm not being restored until the Bore is near the bend of Vieux Port.

On the arrival of the Bore at Quillebœuf, its height, which increases, may be 7 or 8 feet—that is to say, there is that difference of level between low water and that of the flood which rushes upstream in this torrent—so that a boat in front would see before it a liquid wall approaching and capable of engulfing it. The wave comes on in the form of a crescent, concave toward upstream, and its two points breaking furiously along the banks. Another wave follows at about 200 yards, then a third, and a fourth. Then appear the Eteules, silent waves of a very dangerous character, up to (it is said) 16 feet in height, but subsiding heavily as soon as formed. This state of confusion passed, the river flows steadily on; the level does not rise more than an additional 3 feet, although the rate of the stream increases to 7 knots and more. From the first appearance of the Bore until calm is restored after its passage up the river not more than a quarter of an hour elapses.

The Bore is sometimes still higher and more furious at the foot of St. Leonard. It would be very imprudent for any small vessel to be caught in these parts. It subsides very remarkably at La Corvette, where ships, which on account of their draft have not been able to put to sea, await it at anchor ready for weighing and swung to the ebb, for there is no slack water, the ebb ceasing only with the flood, the chain ready to be slipped at a moments notice. Each vessel at the proper moment sets the engines going astern. Notwithstanding this, the vessel runs ahead and commences swinging, the propeller being then used to avoid the banks. Steamers getting under way before the Bore, so as to receive it head-on, should meet it at slow speed, plunging into the wave. Sailing vessels in tow meet it in this manner with a great length of towline.

Continuing its course upstream, the Bore passes abreast of Des Flaques with the same violence as at St. Leonard, and calms down in the deep waters of the anchorage of La Courbe; a little farther on, however, upon the Traverse, it breaks out afresh from one bank to the other. From Villequier it may be seen white with foam, the tide running furiously, leaping up the banks, dragging and submerging everything on its passage. The roar of the approaching Bore is heard from a great distance; at Villequier it has been distinctly heard at night on reaching Aizier, 6 miles distant.

At Villequier boats moor near the lighthouse, under shelter of a rocky submarine point, behind which the water is relatively calm for a small space. But in heavy Bores they should descend as far as Courbe. The boats of Caudebec shelter as well as they can at the Dos d'ane (Ass's back). The appearance of the Bore is particularly attractive at Caudebec, as the waves coming on obliquely, as at Radicatel, on account of the very decided concavity of the bank, only display the greater vigor, and the water recoiling adds to the disorder. Tourists come here in crowds to view the scene, especially at equinoctial tides.

At La Mailleraye, 3.5 miles higher, the Bore loses much of its force, owing to the bank Les Meules, which produces a situation differing entirely from the localities farther upstream by the obstacle which it raises to the retreat of the waters. It may be said that La Piette is the ordinary upstream limit of the Bore, as beyond that it usually becomes only an undulation of greater or less height, according to the bottom over which it passes. At Duclair it is generally possible for a vessel to remain at the wharf; and, finally, at Rouen, the arrival of the undulation only manifests itself, as a rule, by a movement more or less pronounced of the vessels moored along the quays.

It had been hoped that the great improvements effected by the embankments and the deepening of the Seine would have either destroyed the Bore or reduced to a nullity its effects; and, indeed, it was for some time currently reported that such had been the case. Unfortunately time has shown that these hopes have not been verified, though the works have certainly effected some slight modifications. The latest information (1896) shows that the Bore is almost if not quite as strong as ever in the lower reaches, and, as a consequence of the deepening, is certainly stronger than before in the upper part, and notably so at Rouen, where, quite recently, steamers have been known to break adrift from their lashings alongside the quays.

Between the mouth of the Seine and Rouen the following may be taken as approximately the height of the Bore or tidal wave at places from 15 to 20 miles apart:

At Quillebœuf: Strong springs, 7 to 8 feet; weak springs, 4 feet.

At Caudebec: Strong springs, 7 to 8 feet; weak springs, 4 feet.

At Duclair: Strong springs, 2 to 4 feet; weak springs, 1 foot.

At Rouen: Strong springs, 2 feet; weak springs, nil.

These figures refer to the height of the wave alongside the quays or banks, for it has been observed that in midchannel, where the resistance to its progress is less, the height of the wave also is less.

Propagation of the flood.—At present, and as a consequence of the embankments, the rising undulation at neap tides traverses the distance from Berville to Rouen, 58 miles, in 7 hours, representing an hourly speed of 8.3 miles, which is nearly uniform. In mean tides its passage is made in 5 hours, at a speed of 11.6 miles, perceptibly slackened over the shoals and accelerated in deep water. At spring tides the propagation gains in rapidity and loses still more in uniformity; its mean speed is 14.5 miles, the flood getting from Berville to Rouen in 4 hours.

Before the embankments and dredgings took place the rising undulation traveled from Berville to Rouen in 5 hours at spring tides. This is the only information of the kind available of that time, but apparently the tide took one hour longer then than now in its transit between the two places.

As regards the danger of the Bore and of the strong tides generally of the Seine, it is said that if a vessel from any cause takes the ground it frequently happens, especially during springs, that when the flood reaches her she is thrown on her broadside and buried in the sand set in motion by the strength of the stream, and becomes in almost every case a lost vessel. The number of masts standing up in various parts of the river testify that these misfortunes are not infrequent, and the greatest attention should therefore be paid by commanders of vessels ascending the river until they arrive at Quillebœuf, where they can be secured to the quay before their vessels are exposed to the danger of grounding in the channel. If they can not arrive at this position before the end of the flood, they should hasten to take shelter either at Honfleur or Havre while there is yet sufficent water in the narrow channels. Generally speaking, they should not attempt to ascend or descend the river without a leading wind or in tow of a steamer.

Sailing vessels at Havre or Honfleur intending to ascend the Seine, should leave those ports directly as soon as they float, and, with a leading wind, they may expect to reach Quillebœuf before the ebb begins to be felt. This navigation, however, can only be undertaken with safety during spring tides, for, at neaps, the depth of water is not sufficient for vessels of much draft to navigate the lower part of the river. Most vessels waiting at Havre for springs to ascend the river quit the harbor on the ebb preceding the flood which is to take them up to Quillebœuf, and anchor in the Petite Rade; by doing so, they avoid the loss of time which the getting out of harbor would occasion with westerly winds, and do not run the risk of losing a favorable tide.

Rouen.—Of the city of Rouen itself it need only be said that its position as practically the port of Paris has amply justified the efforts so far made to improve its waterway. Its commerce continues to advance, the increase being no less remarkable in the size of the ships than in the aggregate tonnage. The depth of water in the approach is 21 feet and 24½ feet at quays at low water. Merchandise is shipped from Rouen by canal into the various districts in France. Population is 124,987.

There are no docks at Rouen of the kind usually found in seaports. From the river itself four basins are formed—the maritime basin, the fluvial basin, of which the area is 28½ acres, the petroleum and the wood basins. Of these, the maritime basin, or general port, is the largest; its area is nearly 57 acres, with 2,650 yards of quayage on the left bank and 2,780 yards on the right bank, and its depth varies from 16 to 33 feet at lowest tides. Vessels lie alongside the quays, which extend along the banks of the river about 2,200 yards in length on either bank, in depths of from 18½ to 23½ feet at low water.

There are 35 cranes of 1½ tons, 10 of 2½ tons, 8 of 4 tons, one of 10 tons, and one of 25 tons, all belonging to the chamber of commerce, besides 11 cranes of 5 to 6 tons and numerous smaller ones privately owned.

Coal.—A good supply of coal is always in stock, over 2,000,000 tons being imported annually. There are 2,700 yards of coal wharf accommodation with from 20 to 25 feet water alongside.

Patent slip.—There is a patent slip at Rouen, 295 feet long on cradle, with a depth of 14½ feet, capable of taking vessels of 1,800 tons and 312 feet in length. Vessels are hauled up sideways. (This slip can not be depended upon.)

The United States is represented by a consul and a vice and deputy consul.

Lighting of the Seine.

La Rislle Light, fixed white, elevated 33 feet above high water, is at the end of the southern embankment, and is visible 11 miles; here, also, a fog bell is sounded.

A new light, fixed white, visible from a distance of 9 miles, has been established on the Digue du Sud, about 2 miles west of La Rislle Light.

At the end of the northern embankment, abreast the preceding, is a fixed red light visible 4 miles.

From thence upward, all lights on the right or northern bank of the Seine are red, and all those on the left bank are white. In proceeding upstream, therefore, all red lights are left on the port hand and all white lights on the starboard hand.

Pilotage regulations.—The following regulations for the pilotage of the lower Seine were issued by the Chef de la Marine at Havre in February, 1887:

1. Every pilot of Quillebœuf who pilots a ship drawing 5 meters (16 feet 4½ inches) or more up the river, and who has not examined that part during the preceding four days, is obliged before entering the mouth of river to procure an assistant pilot, who undertakes the guidance of the ship as far as the entrance between the dikes.

2. In this case the pilot fees are to be distributed between the two pilots.

3. The assistant pilots are taken to the ships referred to in section 1 by the steamer stationed at Havre, which has to go every day, at the beginning of the flood tide, to meet ships bound for the Seine.

4. Besides taking the assistant pilots to board ships, the steamer is also bound to inform ships going up the Seine, by word of mouth or, if this is not possible, by the following signals, of important facts connected with their course:

(*a*) A blue flag, 5 feet square, with the letter B in white, signifies a clear channel.

(*b*) A blue flag over a red pendant, decrease in the depth of water at the entrance to the mouth of the river.

(*c*) A blue flag under a red pendant, considerable changes in the direction of the channel.

5. The taking on board of the pilots and assistant pilots by the steamer is to be by turns, according to rules laid down by the chief officer of the Seine pilots.

6. The chief officer of the Seine pilots has to take the necessary measures for insuring that the channel is examined by the pilots, if possible, every day; and that pilots do not go to sea if they have not examined the channel the day before.

Special measures will be taken to insure the carrying out of these regulations.

By night.—Vessels desiring to ascend the Seine at night must approach the entrance with great caution, keeping seaward of the transit of Cape de la Heve lights 20° and northward of the line of Honfleur Hospital jetty light on with Fatouville Light bearing 99° until a pilot is received. It is dangerous to arrive close to the entrance until near high water, and it is always prudent to be assured of the aid of a pilot, the signal for which is to hoist a white light at the main and burn torches. Pilots for Rouen will, in addition to the white light visible all around the horizon, show red lights burning from 25 to 30 seconds; those for Havre, Honfluer, etc., will burn white torches at intervals never exceeding 15 minutes.

Note.—The pilot district of Havre extends from a line westward joining Scilly Isles and Ushant to a line eastward joining the South Foreland and Cape Gris Nez.

Shoals in the estuary of the Seine.—We now return to a more particular description of the estuary of the Seine, with the ports on either side and the dangerous shoals by which it is encumbered.

Banc de Seine.—The deposits of sand and mud washed down by the River Seine extend far beyond the shoals at the river's mouth and form an extensive submarine flat and slope, agreeing somewhat in shape with the curve of the bank bordering the shore from Port-en-Bessin to the meridian of the Dives. This flat, on which the soundings increase slowly and regularly toward the offing, occupies the whole breadth of the mouth of the river, and may be said to terminate northward on about the parallel of Cape de la Heve; but on the parallel of Havre a narrow tongue of shoal water, named the Banc de Seine, extends 15 or 16 miles westward of it; this bank is steep-to on its southern side, slopes gradually to the northward, and is not dangerous, having from 7 to 9 fathoms water at its outer part, but the streams cross it obliquely and cause eddies upon its steep edge where the sea is high during northerly gales on a weather tide.

The Banc de Seine and the deep southward of it, called by pilots the Parfond, are useful guides in establishing the position of a vessel during fogs or thick weather, when the navigation can only be carried on by means of the lead. From the western extreme of the bank, in 9 fathoms, Cape de la Heve lighthouses bear 88° 15 miles, and Ver Lighthouse 218° 13 miles.

Banc de Trouville.—This bank of muddy sand, the southwesternmost of the shifting banks at the mouth of the Seine, is about 3 miles long in a 97° direction, fronting and eastward of the entrance to Trouville, and about 1.5 miles wide, with general depths of from 3 to 7 feet water. It is, however, very difficult to define its limit westward, the bank gradually extending in that direction and the water deepening so very gradually that at 1.5 miles farther the depth is only 9 or 10 feet. In the direction of the Banc du Ratier it has also shoaled so much that the depth is everywhere less now than 5 feet at the lowest tides. The sea is exceedingly heavy on this bank with the wind from southwest by west round by west to north by east.

Buoys.—A conical buoy with top mark of two cones, bases together, painted in black and white horizontal bands, is placed southwestward of the Banc de Trouville in about 9 feet water, 1.3 miles 294° from Trouville Pierheads. A red bouy with triangular top mark is moored on the northwest side of the bank, about 1,200 yards 193° of the outer extreme of the Ratelets.

Villerville Channel.—The Banc de Trouville is separated from the shore by the Villerville Channel, a narrow passage formerly much deeper, but which has now a general depth of only 7 feet with a very small area of 8 or 9 feet. The streams follow the direction of the channel, such as it is, and, in calm weather, the flood, at springs, runs about 5¼ hours and ends 15 or 20 minutes after high water at Havre; its greatest rate is about 4 knots, near half flood; the ebb is rather weaker.

Banc du Ratier, abreast of Villerville, and 1.3 miles from the shore, with the Ratelets, a prolongation of the bank westward, forms one of the most dangerous shoals at the mouth of the Seine. The bank is of an irregular shape, and its surface, which dries from 1 to 12 feet above the lowest tides, is covered with a large quantity of stones and rolled shingle; but its base is a mass of compact brown clay, and consequently not subject to change. That part of the surface which uncovers, including the Ratelets, is nearly 2.3 miles long in a 265° and 85° direction, and forms a shelter from the flood stream to the banks of shifting sand eastward of it. From the western extreme of the Ratelets, in 6 feet, Cape de la Heve Lighthouses bear 356° 5.3 miles. The eastern limit of the red light at Deauville passes about 1,600 yards westward of that part of the Ratelets bank which uncovers in 7 or 8 feet at low water.

The Banc du Ratier covers toward half flood, and the sea runs high over it with strong winds between west and north, but, with the latter wind, it shelters in some degree the channel southward of it.

Buoys.—The southern side of the Ratelets and Ratier is marked by three buoys, viz: The Ratelets, black and white horizontal striped, surmounted by top mark of two cones, bases together, showing an occulting white light at the southwest end of the Ratelets; about 670 yards southward of the Ratelets Buoy there is a red conical buoy with top mark; the southwestern Ratier, black with cylindrical top mark, shows an occulting red light; and the East Ratier, at the inner end of the Ratier Bank, red and white horizontal striped, surmounted by two cones, points together, and shows an occulting white light. One the northern side is the northwestern Ratier, a red-light buoy with staff and cone, and shows a fixed green light. Vessels going up the Seine, northward of the Ratier Bank, steer for this latter buoy and leave it on the starboard hand.

Banc d'Amfard lies about 1.5 miles northward of the Ratier, and, like the latter, its base is a mass of brown clay and its surface is covered with large shingle; it also shelters the bank of shifting sand eastward of it. The western part of this bank uncovers only at low water, equinoctial springs, but its surface is subject to great changes, for in 1855 it was found that the stones which constituted its inferior part in 1834 were then buried under shingle 6 feet thick, proving that the shingle on it is not so stationary as on the Ratier.

Buoy.—A red buoy, surmounted by a conical top mark, is moored at the western extreme of the Banc d'Amfard close to a drying patch and about south 1.7 miles from the lighthouse on the eastern side of the entrance to Havre. The position of the buoy is, however, liable to be changed in consequence of alterations in the form and depth of water on and around the bank.

Gambe d'Amfard—Light buoy.—A light buoy, painted black, exhibiting an occulting white light, is situated southwestward of Gambe d'Amfard.

Light buoys.—Ratelets buoy, Ratier southwest buoy, and Ratier east buoy mark the northern side of the channel south of the Banc du Ratier, and Villerville buoy marks the southern side of the channel. In addition to these buoys the channel is marked by gas buoys showing red and green lights. The positions of all these buoys are liable to alteration to meet the changes in the fairway.

The description of the Eclat, Hauts de la Rade, and other shoals on the northern side of the estuary chiefly concern the approaches to Havre and will be included in their proper place in describing that port, which is near the entrance on the right or northern bank of the ward of its edge and distant 1,500 yards from the shore.

Left bank of the estuary of the Seine.—From the entrance of the River Dives to the hill of Notre Dame de Grace, which commands the town and harbor of Honfleur, the left bank of the estuary of the Seine trends about 14 miles 58°, and the coast is bordered by high hills, terminating abruptly toward the sea in cliffs of brown clay and stone and in large land slips, except in front of three valleys, where the shore is low and sandy. The widest and most remarkable of these valleys is that through which the little River Touques finds its way into the sea. This valley is 2 miles wide at the seashore, but narrows suddenly at 400 yards distance inland; it may be recognized from a great distance offshore by the town of Trouville, which is built at the foot of a high steep hill on the eastern side of the entrance of the river; its suburb, Deauville, being on the western side.

Vessels of more than 9 feet draft should be cautious in approaching the coast when within 4.5 or 5 miles westward of the Touques, as the flat, with only from 3 to 10 feet water, there extends 1.5 miles from the shore and increases in width in going eastward, so that off the entrance of the Touques no more than 12 feet water is to be found in any direction at a distance of 2.5 miles. Eastward of the Touques the coast is bordered by uneven rocks, which dry at low water and terminate 3 miles 52° from Trouville in Villerville Point. This point extends 1,200 yards in a 311° direction from Villerville village, and the ledge off it is dangerous to vessels proceeding through the Villerville Channel; it is marked by a red light buoy showing an occulting green light. It is moored in 12 feet water 500 yards northward of its edge and distant 1,500 yards from the shore.

If the buoy should not be in place, this rocky point will be avoided, when passing northward of it, by keeping Roque Point opening and shutting in with Fonds Cliff 81°. Roque Point is a high grayish-white cliff, perpendicular toward the river side, and may be easily recognized, being the first point on the left bank of the Seine, which is seen to open out from Fonds Cliff when coming from the southwest.

Trouville—Touques River.—The entrance to this river lies 58° 7.5 miles from that of the Dives, and is between two piers extending seaward in a 334° direction. The west pier extends 625 yards from Deauville Point on the western side of the river, and the sands dry at low water 800 yards beyond the pierhead. The east pier does not extend so far from Cahotte Point on the eastern side, the pierheads bearing from each other about 97° and 277°. The sands of Deauville form the western side of the channel from the pierhead to the low water line, and it is marked by three red buoys; but from the east pierhead a low dike of rough stone, intended to prevent the eastern sands from drifting into the channel, extends some distance; this dike is marked close to on its western side by three black buoys.

Depths.—The channel between the piers is 164 feet wide; the deepest water, about 19 or 20 feet at high water springs and 4 feet less at neaps, being toward the west pier. There is a flushing contrivance of recent construction, which appears to be effective in maintaining the depths. Within the piers the harbor opens out, and on the eastern side are the quays of Cahotte and of Trouville old harbor, extending up to the bridge, with good grounding berths alongside for vessels up to 12 or 14 feet draft. On the western side, its entrance facing the quays of Cahotte Point, is the wet dock or basin, 985 feet long, 262 feet wide, with 21 feet over the sill at high water springs and 16 feet at neaps; the dock gates are open from 1½ hours before to 1½ hours after high water. This basin is surrounded by extensive quays, and in it vessels of 15 feet draft can lie afloat at all times and unload direct into railway trucks, the railway station being just at the head of the basin, and rails laid along the quays.

There is a gridiron at Trouville, but no dry dock, nor can repairs of any importance be effected. A public and also a private hospital are both available for seamen in case of need.

Coal, etc.—About 4,000 tons of coal are usually in stock at this port; steamers are coaled in the basin or alongside a wharf 983 feet in length, with a depth alongside of 17 to 18 feet. The chief import is coal, of which about 70,000 tons arrive annually; the other imports are wood, cement, ice, etc. The exports are unimportant. There is a large fishing industry.

Trouville, formerly a small fishing port and village, has since 1860 expanded into a place of considerable commercial importance (though its trade appears to be fluctuating), as well as having become a fashionable watering place. Including its suburb, Deauville, across the river, it has a population of about 9,000. The railway station is at Deauville, and the communication is through Lisieux with the Cherbourg and Paris line, as well as eastward and westward with steamers run daily between Trouville and Havre for both passengers and goods, the passage taking about 45 minutes. The small town of Touques is on the river about 2 miles above Trouville, and at springs vessels of light draft can ascend as high as Quai-au-Coq, a small place 5.5 miles in the interior, where there is sufficient water for them to remain afloat.

A lifeboat is stationed at Trouville.

Lights—East Pier.—A group occulting white light, with a red sector, visible from a distance of 11 miles, is exhibited from a white iron turret, 26 feet in height, situated 13 yards from the east pier end at an elevation of 33 feet above high water. This light is 548 yards 330° from Deauville Lighthouse; westward of the bearing 170° the light becomes obscured.

Cahotte Point.—From a white metal column, 45 feet high, at the inner end of East Pier, Cahotte Point, is exhibited a fixed red light. It is elevated 52 feet above high water and visible from a distance of 8 miles.

West Pier.—At 13 yards from the West Pierhead and 86 yards 277° from the East Pier Light, a fixed green light is exhibited from a white iron turret elevated 33 feet above high water and visible from a distance of 3 miles.

Roches Noires Pier.—At the outer end of this pier, which is 1,400 yards eastward of Trouville Piers, are exhibited two fixed white lights placed vertically. The pier extends 400 yards from the shore in a 320° direction, and has 8 feet water at its head. A narrow wharf has been constructed from near the inner end of this pier, extending 300 yards along the shore to the southwestward.

Fog signal.—A bell is sounded during thick or foggy weather from Trouville Harbor East Pierhead.

Tides and tidal streams.—It is high water, full and change, at Trouville, at 9h. 20m. Springs rise 25¼ feet, neaps 21¼ feet above the level of the soundings, which are 3¼ feet below the level of low water, ordinary springs. Springs range 22 feet, neaps range 13 feet. The lowest neaps rise 11 feet above the sands at the entrance in the channel; springs, 16 to 17 feet. Off the pierheads the flood stream takes the direction of the estuary, its greatest strength being only 1½ knots, and for ¾ hour at the top of the tide there is slack water. Between the piers the flood runs at from 2 to 2½ knots, the ebb only 1½ knots at their greatest strength. Outside the piers the ebb turns to the westward and begins to acquire strength half an hour after high water.

Pilots.—Trouville pilots cruise in small sloops, painted black, with the letter T on the mainsail, and carry at the masthead a blue flag with a white anchor; they are almost certain to be met with in any weather at the entrance of the channel.

Directions.—Nearly all the trade is now done by steamers. For sailing vessels westerly winds are the most favorable for proceeding into the harbor. They should not enter until half an hour before high water, but with a leading wind may venture to do so until an hour after that time, if of suitable draft, as the ebb is easily stemmed. With offshore winds small vessels may anchor in about 10 feet water and 1.5 miles from the beach abreast of the plain of Villers, which is 3 miles southwestward of the river entrance; here they remain until the tide has risen sufficiently for them to enter Trouville. But with the wind from northwestward they should, if in charge of a pilot, anchor in the Villerville Channel between the Trouville Bank and the shore, where they is a small space with 1¾ or 2 fathoms at low water; if the wind should then freshen and back to westward or southwestward they will be able to run through the channel and take refuge at Honfleur.

The coast.—From the mouth of the Touques, the steep coast trends 3 miles 41° as far as the small village of Villerville, which stands rather high; it then bends more eastward for 4 miles to the hill of Notre Dame de Grace, one of the highest, and also the conspicuous hill in the estuary of the Seine, which is 3.3 miles wide between this point and Hoc Point on the northern shore. The only part between Trouville and Honfleur where the shore is low and accessible at high water is eastward of Villerville between it and Vasoui.

Honfleur.—This port is at the entrance of a beautiful valley, open to the northeast, and just eastward of the hill of Notre Dame de Grace. It is sheltered by the land on all sides, and the wind never raises sufficient sea to make it dangerous to enter. Being so near Havre, it neither has nor needs much plant for repairing vessels, and its large building yards are now but little used. The trade of the port steadily decreases, no doubt owing to the improvement in the Seine navigation and consequent growth in the trade of Rouen. The exports are chiefly dairy and agricultural produce; the imports, timber and coal. The steamers of the London & South Western, and of the London, Brighton & South Coast Railways run regularly between Honfleur and Southampton and Newhaven respectively. The railway station is on the eastern side of the harbor, and the line connects with the general system of the country is Lisieux. Honfleur has both a sailors' home and a hospital; its population is about 9,700.

Coal.—An ample supply of coal can always be obtained, there being usually about 3,000 tons in stock. Steamers are coaled lying afloat at their ordinary berths alongside the quays in the basins. There is a new coal dock being built (1914).

The port consists of an outer tidal harbor and of four wet docks of Bassins-à-flot, viz:—the Bassin de l'Ouest, Bassin du Centre, Bassin de l'Est, and Bassin Quatrième. Provision is made by means of sluices, a large Bassin de Chasses, and other reservoirs of water for scouring them, as well as the channel leading into the port; there is also a small tidal harbor on the western side, which serves chiefly for steamboats and small craft employed in the daily transport of passengers and country produce to Havre.

The Bassin l'Ouest is 426 feet long by 256 feet wide, and its depth is 18 feet at high water, extraordinary springs, 16½ feet at ordinary springs, and nearly 10 feet at neaps. The Bassin du Centre is 426 feet in length, 295 feet in width, and its depth is 21¼ feet at extraordinary springs, 20¼ feet at ordinary springs, and 13 feet at neaps.

The Bassin de l'Est is 985 feet in length, 236 feet in width, and its depth is 22¾ feet at extraordinary springs, 21¾ feet at ordinary springs, and 14½ feet at neaps. The Bassin Carnot is 2,625 feet in length, 229 feet in width, and is 18 inches deeper than the Bassin de l'Est. The depth over the sills of the dock entrances is about 1 foot less than that over the floors of the respective basins.

The Bassin Carnot communicates with the Bassin de l'Est, and is opened at scheduled times, the other three basins being in communication with the Avant port.

There is a gridiron near the entrance to the Bassin de l'Est.

Quay frontage and storage are very ample, and all modern appliances, steam cranes, etc., are available for the rapid loading or unloading of ships.

The entrance of the port is between two piers, partly stone and partly timber, 230 feet apart, and it is open to 356°. The West pier extends 370 yards from the shore; and, from its head, the northern end of the breakwater of the Bassin de Chasses, which forms the eastern side of the entrance, bears 69° about 300 feet. The East pier is prolonged by a rough stone submersible dike, 650 yards long, constructed in 1886, to direct the channel and periodical flushings in order to overcome the rapid silting up to which this port appears to become more and more liable; the dike is marked by branches of trees at frequent intervals. The shifting sands uncover 400 or 600 yards beyond the pier heads. The direction of the channel, being very subject to change, is marked by buoys, in accordance with the French uniform system, their positions being shifted as occasion may require.

A sand bank, from 9 to 33 yards wide, and drying 20 feet at low water springs, lies off the eastern side of the West Pier.

A sand bank, from 5 to 13 yards wide, and drying 10 feet at low water springs, lies off the western side of the East Pier, near its northern extremity. Vessels should keep at a distance of from 16 to 22 yards from the East Pier to pass through the channel between these sand banks.

Vessels at high water springs usually pass over the small banks which form at the entrance of the channel, but it is dangerous for vessels under any circumstances to enter without a pilot, the sand being so movable and the streams, which set obliquely across the channel, so rapid, that a laden vessel grounding during a high tide would run great risk of being totally lost.

Pilots.—Honfleur pilots have the initial letters H. O. painted on their sails.

Depths.—The depths in the old channel were 23 feet at high water, equinoctial springs, 21 feet at ordinary springs, and 17½ feet at neaps. Of the new channel it can only be said that in consequence of the shifting nature of the sands the depths are very uncertain, but are 5 feet less at neaps than at springs. Westerly winds of any duration serve to raise the water, and easterly winds have a contrary effect. During rainy weather and at the melting of snow the freshets of the Seine are abundant, and with strong westerly winds they contribute greatly to raise the water in the port.

Tides.—It is high water, full and change, at Honfleur at 9h. 29m.; springs rise 23 feet; neaps, 18 feet. High-water slack lasts only 15 or 20 minutes, but the change in height from half an hour before to half an hour after high water not being more than 3 or 4 inches. The three basins communicating with the Avant port are open by day from 1½ hours before high water at Havre to 1 hour after the same, when the height of the Havre tide is less than 23 feet, and to high water at Havre when the Havre tide is more than 23 feet; by night, from 1½ hours before high water at Havre to high water at Havre always. The usual tidal signals are made from a mast on the East Jetty near the lighthouse.

A lifeboat is stationed at this port.

Lights—West Pier.—From a white iron tower on the West pier, 14 yards from the pierhead, is exhibited a fixed green light, elevated 33 feet above high water, and visible 4 miles.

Fonds Cliff.—A group occulting light, with white, red, and green sectors, has been established at the foot of Fonds Cliff, at a distance of 1,600 yards 57° from Vasovi Church. It is elevated 47 feet above high water, and visible 12 miles.

Breakwater.—At the northwestern extreme of the breakwater of the Bassin de Chasses, 69°, about 300 feet from the West Pierhead, a fixed red light is shown from a wooden beacon at an elevation of 18 feet above high water, visible 4 miles.

East Pier—Tidal light.—From a circular masonry tower, 32 feet in height, on the eastern pier at the entrance to the tidal harbor, a fixed white light, varied by red and green flashes, is exhibited at an elevation of 39 feet above high water and visible 9 miles. This light is shown only when the water level is 9¾ feet above standard low water, or when there is 6½ feet or more in the channel.

Interior jetties.—Two small fixed white lights are also shown from the interior sides of the jetty heads of the port. A fixed green light is shown from the Transit Jetty, and a fixed orange light from Lieutenance Jetty.

Fog signal.—During thick or foggy weather a bell is sounded by machinery during the whole time that there is more than 6½ feet water in the port, when the tidal light is or would be shown. The signal is made from the West Pierhead.

Fatouville Lighthouse is an octagonal tower 105 feet high, on the high lands of Fatouville, 3.5 miles 100° from Honfleur West Pierhead; from it is exhibited at an elevation of 419 feet above high water a fixed and flashing light, visible 21 miles. The light shows fixed white, with a red flash; the flash is preceded and followed by a short eclipse, which, however, is not total within a distance of 12 miles.
short eclipse, which however, is not total within a distance of 12 miles.

Directions.—Honfleur is accessible to vessels of moderately deep draft during springs; its trade is becoming year by year more engrossed by steamers, but as a few large sailing vessels still use the port the following directions, mainly applicable to them, appear to be necessary. Vessels arriving at the mouth of the Seine, at neaps, must wait for water to enter the passages leading to Honfleur either under sail, with the wind from southwest by west around by west to north by east, or at anchor in the Grande Rade, off Havre, if the wind be off the land; if remaining only a day or two for sufficient water they may anchor in Carosse Roads, southward of the prohibited anchorage, in a depth of from 5 to 7 fathoms, mud and sand. At this anchorage the stream runs toward the Seine until 4 hours flood: its greatest strength is at 3 hours before high water at Havre and does not exceed 4 knots.

Vessels having only a few hours to wait for tide should keep under sail westward of the two light buoys in Carosse Roads, but should the strength of the tide drift them toward the river they must anchor before passing these limits.

Passes de Honfleur.—Two passages lead to Honfleur. The entrance to the Seine is subject to great and constant changes and should not be attempted without a pilot. The shifting sands in the north passage, between the Amfard and Ratier Banks, dry 2 to 4 feet at low water; the deeper channel is that southward of the Ratelets and Ratier Banks. Pilots take sailing vessels through the north channel with the wind between west by north and north by east; but with contrary winds, although there is room to work, large vessels are usually towed. The channel is marked by red and green gaslight buoys, constantly watched, and their positions changed as may be necessary—red buoys to be left on the starboard hand, black buoys on the port hand when entering, as usual.

The south passage is between the Ratier and Trouville Banks; its leading line is the northern extreme of Fonds Cliff, Honfleur, on with Roque Point, remarkable for its gray tint and its perpendicularly steep shore. In running through this mark must be kept on until abreast of Villerville Point, thence, to clear the bank off Vasoui, which dries 1 to 5 feet, keep nearly a mile from the shore (passing but a short distance southward of East Ratier buoy), when gradually close the shore to 600 or 800 yards, avoiding the bank abreast Vasoui as draft of vessel and rise of tide require. At night Roque Light, just open of Fonds Cliff Light, leads up to the entrance of this passage, but bear in mind that fixed directions can not be given in consequence of the shifting nature of the sands.

This passage is the deepest, is marked by red and green light buoys, constantly watched, and their position changed as may be necessary—red buoys to the left on the starboard hand, black buoys on the port hand when entering, as usual—and is generally taken by sailing vessels with the wind between southeast by south and west by north; coasters may run through it at 2½ hours and larger vessels at 3½ hours flood; but with a leading wind during springs it should not be entered by large vessels until 4 hours flood, as between Villerville and Honfleur that stream runs with great rapidity in the direction of the passage. The flood stream at springs commences 5 hours before high water at Havre and runs 5½ hours; its greatest velocity is toward half flood and is sometimes 7 knots between Vasoui and Honfleur. Should a vessel arrive abreast of Vasoui much before high water, she should sheer a little inshore, where the tide has less strength, and anchor until nearly high water. With strong southerly winds, vessels should be on their guard against the heavy gusts which rush down the narrow valleys between Penne de Pic and Honfleur; vessels have sometimes been dismasted by them.

Small vessels, when bound to Honfleur from the southwestward, may use the Villerville Channel, but in doing so they must proceed with caution by the lead and haul off in time to give a good berth to the rocky ledge off Villerville; having passed the red light buoy moored 800 yards from its outer extremity they may proceed by the leading mark for the south channel.

Entering Honfleur.—To enter the port, keep the point of the transit midway between the entrance piers. The most favorable winds for a sailing vessel to enter this port are those between southwest by west and northeast by east round by north. The channel is crossed obliquely by the flood and ebb streams, and their extreme velocity at springs is from 5 to 6 knots. The flood stream runs 5½ hours and ends just at high water; it is during the 15 or 20 minutes of slack water which then ensues that a pilot prefers to take in a vessel of deep draft, there being then but little difficulty in following the course of the channel.

Plenty of sail should be carried in passing through the outer part of the channel, and an anchor should be always ready to let go in case a sudden shift of wind or the heave of the sea should force the vessel out of the channel. In the event of such an accident, a signal for a tug should immediately be made by hanging the colors under the bowsprit. If the entrance is missed, anchor at once and await the arrival of the tug; or, failing her, with the commencement of the ebb, quit the river as speedily as possible.

With a fresh southerly wind, it is necessary to guard against the sudden offshore gusts before referred to; they are frequently felt under the hill of Nortre Dame de Grace and blow strongly down the valley at Honfleur. With a head wind or a calm, a tug should always be obtained, and when nearing the entrance channel the towrope should be well shortened in, and great attention paid to follow exactly the wake of the towboat, for the smallest deviation in the steerage is here sufficient to run the vessel ashore.

Right bank of the estuary of the Seine.—The extensive chalky level forming the plain of Caux, of which the mean height is about 375 feet above high water, bounds the northern shore of the estuary of the Seine; and from Cape de la Heve, its most western point, as far as the meridian of Quillebœuf, the northern or right bank of the river presents, for a large portion of its extent, a face of perpendicular chalk cliffs intersected by deep valleys. About 1 mile eastward of Cape de la Heve, however, commences a broad alluvial flat which, for a distance of 4 miles, fronts the high chalk formation. The town and port of Havre occupies the western portion of this flat, and the little town of Harfleur is at its eastern end, at the entrance to one of the deepest valleys.

Cape de la Heve, formerly called Chef de Caux, is 2 miles 322° of the entrance to Havre, and forms the western point of the chalky cliffs which terminate the plain of Caux. The cape is perpendicular about half way down from its summit, the foot of the cliff being covered with the débris of frequent land slips and fallen masses; works are now in progress to prevent further destruction or the lighthouses would very soon be in danger.

Light.—On the summit of Cape de la Heve stands a square white lighthouse, 66 feet high, with its light, an electric flashing white, visible 27 miles, at an elevation of 397 feet above high water; and the light is obscured by the Bleville Hills when bearing 198°.

While the eclipses are total a continuous light caused by the brilliant illumination of the lantern is visible 15 miles under certain circumstances.

The lead should be frequently used when approaching this light from the westward, especially if the Ver Light has not been sighted.

Light vessel.—At about 7 miles 285° from Cape de la Heve Lighthouse a light vessel is established, exhibiting at an elevation of 39 feet a group flashing red light visible 11 miles. The light vessel is painted in red and black bands, carries one mast, and is marked LE HAVRE in white letters on each side.

Fog signals.—A fog siren and a submarine bell are sounded.

An experimental radio fog signal, with a wave length of 120 meters, makes the letter H of the Morse code.

Watch buoy.—A white spindle watch buoy is moored about 400 yards southeastward of the light vessel.

Telegraph cable.—The telegraph cable communicating with America, via Ballinskellig Bay, Ireland, leaves the shore about ½ mile northeastward of Cape de la Heve.

Semaphore.—There is a semaphore station on Cape de la Heve; it stands midway between the two lighthouses but westward of their line.

Le Havre.—The town, tidal harbor, and large bassins-a-flot or wet docks of this important port occupy the western part of the low plain before described. Steamers of the largest size run to and from all parts of the world, and by means of the railway to Rouen and Paris, as well as by its extensive and constant steam river traffic, Le Havre has excellent means of communication with the interior of France. Large extensions and improvements are being carried out at this port.

The principal imports are cotton, coal, coffee, grain and flour, hides, timber, dyewoods, petroleum, tobacco, oil seeds, palm oil, etc. The principal exports are silks and ribbons, broadcloths, dyes and essences, cotton goods, furniture, millinery, wines, brandy, etc.

The population of the town is about 132,430. There is a hospital available for seamen in case of accident or illness, a sailors' home, and also reading rooms for seamen.

Supplies.—**Coal** is to be obtained at Le Havre in any quantity, the stock on hand being usually about 14,000 tons. Vessels are coaled alongside the quays in the docks, either from carts or barges or both. Many of the wet docks have sufficient depth of water for the largest sized merchant vessels to lie afloat at all times. Every kind of supply is plentiful and good.

The United States is represented by a consul and vice and deputy consul.

The outer harbor is now completed, but dredging operations are still in progress for deepening the basin and channel. (1914.)

Its entrance toward the west lies between the heads of two breakwaters and is about 220 yards wide.

The Dique Nord and breakwater project 930 yards in a 199° direction from the end of the Boulevard de Strasbourg, and there is a small tidal basin within its inner end.

On the south side of the harbor the Quai de Maree (tidal quay) extends 547 yards in a westerly direction from La Floride and berths the largest vessels, having sufficient depth to allow them to lie alongside at low water. It is connected with the railway. From its outer end a mole extends 400 yards in a slightly more southerly direction. (This mole is only a temporary construction, which will be demolished shortly to make the entrance of the new south deep-water extension of the outer harbor, referred to later.) From the end of the mole the Dique Sud extends about 900 yards in a northwesterly direction, turning to the north for 80 yards of its outer extreme.

Caution.—Vessels should not approach within 100 feet of the visible part of the moles or breakwaters of the new outer harbor in order to avoid their rock foundations.

Depths.—The depth in the channel, outer harbor, and Avant Port at the time of last report was 19½ feet, and dredging was underway to maintain a depth of 24½ feet.

The Old Avant Port, or Tidal Harbor, lying inside and to the northeast of the outer harbor, is bordered by wide and commodious quays on all sides and is well sheltered by the outer breakwaters; its entrance is about 120 yards wide. The bottom at the entrance consists of shingle cemented by mud, very hard, and bad for anchors, but inside the shingle is covered with a layer of mud, which forms a good bed for vessels to ground on. The north quay is used by passenger steamers for the Seine and neighboring ports. Tugs lie alongside the Floride Quay. The rest of the harbor is used by coasters and by vessels waiting tide to go up the Seine.

Harbor extension works.—Further extensive works are in progress as follows, the contract having been given out in 1910: The new works will be built almost entirely in the bed of the Seine, and will consist of a tidal basin formed on the east by a wall built out into the river and on the south by an embankment 1,900 yards long. Inside these walls an extension of the outer harbor will be made, leading to the new tidal basin to be constructed beyond it and parallel to the present Bellot Docks. At lowest spring tides there will be 39½ feet of water alongside the quays of this basin. The length of quays around the tidal basin will be about 4,900 yards. In the northeast corner a dry dock, 984 feet long, will be built. These water spaces will not occupy the whole of the space inclosed by the outer walls, but can be extended as time may require by two dry docks, even larger than the first, and by another tidal basin or dock further to the eastward.

Basins.—There are at Havre eight basins or wet docks with ample quay accommodation and storage, which communicate with the tidal harbor and with each other by gates.

The basins are named the Bassins du Roi, de la Barre, Vauban, de l'Eure, Bellot, du Commerce, de la Citadelle, and Bassin Dock.

The Bassin de l'Eure is the largest; the depth of water on the sill at its entrance is 34 feet at high water springs and 29½ feet neaps; that on the sill of the Bassin Bellot is about the same; in both cases this is a considerably greater depth than the present approaches to the port require.

The width of the entrance to the Bassin de l'Eure, which is the basin used by the large transatlantic steamers, is 100 feet; the new lock leading from the Tidal Harbor to this basin is 793 feet long, with a width of 85½ to 98½ feet, and depth of 16¾ feet on outer sill at low water.

The entrances to the other basins are from 98½ feet to 39 feet wide, the latter being the width of the entrance to the Vauban Bassin. The sills of the gates of the Bassins du Roi and de la Barre have 21½ feet over them at high water ordinary springs.

The gates of the Bassins du Roi and de la Barre can remain open without inconvenience until the water has fallen 2 feet below high water, which, both at spring and neap tides, takes place about 1½ hours after high water slack; and as these gates are opened by the pressure of the rising tide about as long before the commencement of slack water it follows that the basins can communicate with the harbor during 3½ or 4 hours of each tide.

The Bassins du Roi, de la Barre, de la Citadelle, and de l'Eure are entered from the Tidal Harbor; Bassin du Commerce from Bassin due Roi or Bassin de la Barre; Bassins Vauban, du Dock, and Bellot from Bassin de l'Eure; Bassin de la Citadelle has also communication with Bassin de l'Eure, and Bassin Vauban with Bassin de la Barre. The Canal de Tancarville is entered from Bassin de l'Eure and from the Bassin Bellot.

Dry docks.—Havre has six dry docks of the following dimensions:

Docks.	Length.		Breadth of entrance.	Depth over sill at high water ordinary springs.
	On blocks.	Over all.		
	Feet.	*Feet.*	*Feet.*	*Feet.*
No. 1	198½	234⅓	36	18¼
No. 2	202	220	42½	19¾
No. 3	249	272	52½	21⅓
No. 4	615	656	99	29⅓
No. 5	492	537	66	28
No. 6	377	416	53	25¼

There are three pontoons with a collective lifting capacity of 1,200 tons.

Repairs.—At La Havre there are repairing slips, masting sheers, and every facility for repairs of all sorts to hull and machinery.

Lifeboats.—Three lifeboats are stationed at Havre or in its immediate vicinity.

Pilots.—The pilots of Havre are numerous and skillful, and are paid according to the distance piloted. By the regulations, the greatest distance to which pilots take vessels is to Cape Barfleur, and the least to outside the banks at the entrance of the harbor; there is great competition among them, however, and being provided with excellent boats, they frequently meet vessels as far westward as the Casquets. Those who pilot vessels out of harbor are bound to conduct them clear of the outlying banks; if they consent to take them farther, they are paid $3 or by special agreement. Tugs are always in readiness, and the signal for their services being required is an ensign suspended under the bowsprit.

The pilotage district of Havre extends from a line westward joining Ushant and Scilly Isles to a line eastward joining Cape Gris Nez and the South Foreland.

Outer harbor lights.—The new harbor works and the dredging of a new channel to a depth of 14¾ feet at low water springs were completed and the harbor opened on February 15, 1906. The following lights and light buoys are established:

North Breakwater.—A red flashing light is exhibited from a white trelliswork iron turret on the head of the new North Breakwater at an elevation of 49 feet above high water and is visible 12 miles.

Fog signal.—A fog trumpet is sounded.

South Breakwater.—A fixed white light, elevated 49 feet above high water, and visible 11 miles, is exhibited from an iron trelliswork turret, painted white, on the head of the new South Breakwater.

Fog signal.—During thick or foggy weather a bell is sounded.

Leading lights.—The center of the northwestern entrance to the dredged channel leading to the outer harbor is marked by three red fixed lights. The front light is elevated 39 feet above high water, visible 11 miles, and shown from a metal support, painted white, with a wooden top mark, erected on the new North Breakwater about 700 yards from its head.

The middle light is elevated about 72 feet above high water, visible 14 miles, and shown from a similar support erected at a distance of about 260 yards 90° from the front light.

The rear light (electric) is elevated 131 feet above high water, visible 15 miles, and shown from the north cupola of the Exchange, situated at a distance of about 1,500 yards 90° from the front light.

These three lights in line lead through the center of the dredged channel to the Little Road.

North Mole.—From a black iron column, 78 feet high, on the North Mole of entrance to New Tidal Basin, is exhibited a fixed green light, elevated 85 feet above high water, and visible 15 miles.

This light in line with the fixed white light on the head of the new South Breakwater bearing 111° leads from the first leading line for the dredged channel toward the entrance to the outer harbor

Light buoys.—The dredged channel in the northwest passage leading to the entrance of Havre Outer Harbor is marked by five light buoys moored about 30 yards from its limits, those on the northern side being painted black and marked A 1, A 3, A 5, each exhibiting a red fixed light; that on the southern side being painted in black and white horizontal bands, marked A 2, and exhibiting a white occulting light, and, secondly, a buoy painted red, marked A 4, exhibiting a white fixed light. They are in the following positions: A 1 buoy is moored at a distance of 3,100 yards 227° from Cape de la Heve South Lighthouse; A 3 buoy is moored at a distance of 2,600 yards 215° from Cape de la Heve South Lighthouse; A 5 buoy is moored at a distance of 2,240 yards 193° from Cape de la Heve South Lighthouse: A 2 buoy is moored at a distance of 3,400 yards 221° from Cape de la Heve South Lighthouse; A 4 buoy is moored at a distance of 2,640 yards 190° from Cape de la Heve South Lighthouse. Other light buoys are also in position off La Havre, which are described with the remaining numbered buoys.

Tides.—It is high water, full and change, at Havre at 9h. 18m. Springs rise 25¼ feet, neaps 21¼ feet, above the zero or level of soundings on the chart, which level is about 3¼ feet below that of low water, ordinary springs. Neaps range 12½ feet. The ordinary tidal signals are made from the signal station at the northern entrance point of the tidal harbor, and are repeated from a signal station about 400 yards 142° from Cape de la Heve Lighthouses.

Strong and lasting westerly winds have sometimes raised the water to the level of the quay, but this rarely happens. The wind, however, has great influence on the height of the tide. The freshets of the Seine during a rainy season or the melting of the snow also contribute greatly to raise the water level in the harbor, and it has been remarked that the highest tides have almost always occurred during the strongest freshets.

Havre has the great advantage over most of the harbors on the French side of the channel of a long period of slack at high water. The maximum duration of this high-water slack has been observed to be 1h. 15m., the minimum from 20 to 25 minutes, and the mean interval 57 minutes. This long period of slack water, together with the very slight rise and fall for a considerable time before and after, is very valuable to the traffic of the port, as it allows the basins to be open for three or four hours, and therefore many vessels are able to enter or leave the docks on the same tide. During the months of May, June, and July, the duration of slack water is, with some exceptions, generally less than the mean; the rest of the year it continues almost always for an hour or more. At springs the duration of the flood is 5h. 10m., and of the ebb 7h. 15m.

Harbor signals.—To prevent accidents to vessels entering the harbor, the following additional signals are made at a mast, 115 feet high, on the north quay, and repeated at a similar mast erected on the north breakwater head; a third similar mast is erected at the Transatlantiques Lock for the signals concerning vessels destined for that lock.

A white flag with blue border at the masthead: The basins are open.

A ball above the yard pointing toward the road: Can not enter the port.

A white flag with blue border at the masthead and two balls under the yard pointing toward the port: No vessels allowed to go out, and all movements in the tidal harbor forbidden.

A ball above the yard pointing toward the road and two balls under the yard pointing toward the port: No vessels allowed to enter or go out, and all movements in the tidal harbor forbidden.

Two balls under the yard pointing toward the port and one ball above the yard pointing toward the road, a white flag with blue border at the masthead: All movements stopped in the port to facilitate the entrance of a large vessel of war or of a transatlantic steamer.

Two balls under the yard pointing toward the port and one ball above the yard pointing toward the road, a green cornet at the masthead: All movements stopped in the port to facilitate the departure of a large vessel of war or of a transatlantic steamer.

One ball at the yard arm to the left of the mast: The dredger is in the channel; pass northwestward of her.

One ball at the yard arm to the right of the mast: The dredger is in the channel; pass southeastward of her.

At night the white and blue flag is replaced by a white light, the green cornet by a green light, and the balls by a red light.

Dangers off Havre.—The approaches to Havre are obstructed by banks of stones and shingle, which form a belt of dangers fronting the shore from 2 miles eastward of the entrance to Cape de la Heve. The highest parts of this belt are the Banc de l'Eclat, Hauts de la Rade, and Haut de la Petite Rade. By the survey of 1855 there appeared to have been no perceptible alteration in these banks since 1834; the summit of the Eclat is, however, a little higher since the latter date.

Banc de l'Eclat is divided into two high ridges about 200 yards apart; 6 feet is the least water on the southern end of the northern ridge, but the highest part of the southern ridge is awash at low water and is one of the most dangerous spots in the neighborhood of

Havre. The surface of this shoal patch is covered with masses of flint and shingle; from it Cape de la Heve southern lighthouse bears 36° 1.1 miles and the North Breakwater Lighthouse 112° 1.7 miles.

In the depression between the two ridges of the Eclat Bank there is only about 13 feet water.

The dredged Passe du Nord Ouest or main channel leads into the Petite Rade between the Banc de l'Eclat and the Hauts de la Rade.

Two shoal heads, with 2¼ fathoms water over them, lie nearly ¼ mile outside the Banc de l'Eclat and in the outer northern part of the Passe du Nord Ouest, within 200 yards distance of A1 light buoy.

The Hauts de la Rade commence about 800 yards 154° from the shoalest spot on the Eclat, and with the Grand Placard, the Haut du Sud-Ouest, and the Haut de Quarante extend 2 miles beyond the entrance to Havre. The Hauts de la Rade consist of three ridges separated from each other by narrow channels with from 10 to 12 feet water, and inshore of and sheltered by these ridges is the Petite Rade and the main channel. The Northwest Ridge is about 1,000 yards long and 200 yards wide; it has 4 to 5 feet water on its highest part, which bears 148° 1,100 yards from the highest part of the Eclat.

The southwestern ridge lies 1,000 or 1,200 yards southwestward of this dangerous spot; it has only 6 feet on it, and 10 feet at its western edge with Cape de la Heve Lighthouses nearly in line; it is the outer danger on the parallel of the entrance to Havre. Nearly midway between its edge and the Eclat is a third rather extensive rocky flat with from 9 to 12 feet water.

The Grand Placard is nearly halfway between the western edge of the southwestern ridge and the tidal harbor entrance, and about 600 yards 97° from it is the Haut du Sud-Ouest; the latter has as little as 4 feet on it; the former only 1 foot of water at its eastern side.

Haut de la Petite Rade, a heap of stones and gravel with 3 feet water, lies at the southeastern end of the Petite Rade and off the entrance to the new Outer Harbor; it will probably be removed by dredging.

The Haut de Quarante is the eastern part of these dangers, and lies on the eastern side of the former entrance to Havre; it has as little as 1 to 2 feet on its outer part, only 800 yards from a depth of 4 feet on the Haut du Sud-Ouest. The two banks are connected by a 6-foot ridge.

Buoys.—The following buoys at present mark the shoal just described and the approaches to them; and, consequently, indicate the position of these dangers to all vessels bound to Havre and to those from the northward bound up the Seine. Some of the buoys are numbered and some are not; new buoys are sometimes added, while others are withdrawn; the numbers, however, have but little or no reference to their positions, and they are consequently now described in the order in which they would be seen by a vessel approaching from the northward or northwestward. A stranger should under no circumstances pass within the outer line of buoys marking these shoals without a pilot.

A light buoy with a whistle and bell, painted black, shows a fixed white light, lies in a depth of about 7 fathoms 258°, nearly 700 yards from Cape de la Heve Southern Lighthouse. The whistle should be heard under favorable conditions of wind and sea from a distance of several miles.

A bell buoy striped horizontally black and white, with diamond top mark and reflector, is moored at the northern end of the Banc de l'Eclat, with the semaphore on Cape de la Heve bearing 83° 1,150 yards.

L'Eclat northwestern buoy, 1,300 yards 224° from the last buoy described, is a black spindle buoy with cylindrical top mark; from it the semaphore bears 61° 1.1 miles.

Passe du Nord buoy, 1,150 yards 100° from l'Eclat northwestern buoy, is a red spindle buoy, with conical top mark, from which the semaphore bears 36° 1,550 yards.

Nord du Mouillage buoy, at 2.9 miles 245° from La Floride South Lighthouse, is a light buoy showing a fixed red light; it is painted black.

Haut de Quarante buoy, from which a fixed red light is exhibited, is also a bell buoy; it is painted black and lies on the southern side of the dredged southwest pass. It is moored 2,200 yards 230° from La Floride.

Grand Placard North buoy, 1,800 yards 314° from Haut de Quarante light buoy, is a red spherical can buoy marking the northeastern side of the Grand Placard.

Carosse Roads light buoy.—A light buoy, painted in black and white horizontal stripes, exhibiting a fixed white light, has been established on the southern edge of Carosse Roads in 4 fathoms; it is situated at a distance of 3.5 miles 228° from La Floride.

A Spoil buoy, painted white, conical, with cylindrical top mark, is moored in a depth of 8 fathoms off Cape de la Heve, with the South Lighthouse bearing 109°, distant 2,900 yards; it indicates the position where dredging spoil is deposited from the port of Le Havre.

Harbor extension works buoys.—Buoys have been established to mark the latest harbor extension works, as follows:

(*a*) Buoy painted white, situated 1,300 yards 150° from South Breakwater Lighthouse.

(*b*) Light buoy painted white, exhibiting a fixed red light, situated 2,070 yards 150° from South Breakwater Lighthouse.

(*c*) Buoy painted white, situated 2,100 yards 142° from South Mole (inner) Light.

(*d*) Conical buoy painted white, situated 3,240 yards 127° from South Mole (inner) Light, exhibiting a fixed red light.

Mariners should not pass through the space between these buoys and the existing port works northward of them.

Petite Rade de Havre is the anchorage inside the banks just described between Havre and Cape de la Heve. It is well sheltered with the wind from northeast by north around by east to southeast by east, but is open to all others, and strong breezes between north by west and by southwest by west send in a heavy sea. The holding ground is good, and anchors take such firm hold in the clay that there is sometimes great difficulty in weighing, especially when vessels have been riding to strong westerly winds. It should, however, only be used as a temporary anchorage where vessels may wait, with offshore winds, for sufficient water to enter the harbor, but they should not remain there in unsettled weather, nor if it blows strongly from the westward.

The Petite Rade de Havre, within the limit of the 3-fathoms line of soundings, is about a mile long in a northwest and southeast direction and 800 yards wide; the depth generally is 22 or 23 feet at lowest tides, but in the center part of the northern half of this space the depth is about 25 feet. From its center Cape de la Heve Lighthouse bears 19°, and North Breakwater Lighthouse is in line with South Mole Lighthouse.

Caution.—Care should be taken not to anchor near the submarine telegraph cable which runs through the northern portion of Petite Rade.

Small vessels anchor nearer the shore with the North Breakwater Lighthouse bearing 120°; but no nearer than to have Cape de la Heve Southern Lighthouse bearing 345°. The holding ground here is so good that, unless she parted, a small vessel with a good scope of chain would be in no danger during a westerly gale.

Directions.—The Passe du Nord entrance to the Petite Rade de Havre for vessels of moderate draft at low water is between the cliffs of Cape de la Heve and the northern ridge of the Eclat, but a stranger should not use it without a pilot. The least depth midway between the northern ridge and the shore is 15 feet, on a flat projecting 400 yards eastward from the Banc du l'Eclat.

To enter this channel steer for the southern lighthouse on the cape on a 114° bearing; this leads 530 yards northeastward of the bell buoy on the northern end of the Eclat Bank, and when about 600 yards from the cliffs the vessel is in midchannel and must then bear away southward for Passe du Nord buoy, moored between the northern ridge of the Eclat and the shore, keeping it well on the starboard bow and taking care not to approach sufficiently near the land as to entirely lose sight of the lantern of the northern lighthouse.

Main Channel, or Passe du Nord-Ouest.—The deepest channel (22¾ feet M. L. W. S.) into the port of Havre is that which has been recently dredged between the Banc de l'Eclat and Les Hauts de la Rade, leading into the Petite Rade; it is marked by leading lights and light buoys.

It has a depth of 14¾ feet at low-water springs from seaward to within 600 yards of the entrance to the outer port, and dredging is still in progress.

Outer anchorages.—That known as the Grande Rade de Havre is completely abandoned now, on account of its distance from the port and the heavy ground swell there. Large vessels obliged to await a sufficient rise of tide to enter the port of Havre or to go up the Seine anchor in the Rade de la Carosse, about 2 miles southwestward of the harbor entrance, in 6 to 7 fathoms of water.

The Rade de la Carosse lies outside the shoals and to northward of the Ratelets and Ratier Shoals, and from it all the signals relative to movements in the harbor can be seen; but it would be dangerous to lie here in strong westerly winds, and it is wiser in such circumstances to put to sea if the harbor can not be entered.

The anchorage is found without difficulty by day or by night. From a central position in the roads the two lighthouses of Cape de la Heve are in line bearing 20°, the Hotel de Ville is in line with the entrance to the harbor bearing 53°, and Fonds Cliff Light at Honfleur bears 107°, about 8 miles distant.

The Nord du Mouillage light buoy is moored in 7 fathoms about 800 yards eastward of this position and the Carosse Roads light buoy is moored in 4 fathoms 180° distant 2,200 yards from the above buoy, on the southern edge of the roads.

Measured distance.—A measured distance of 6,677 feet for the speed trials of ships is marked off by beacons on the eastern shore of the Grande Rade; one pair of beacons surmounted by globes are placed about a mile northward of the semaphore at La Heve and the two others of the same character are in the vicinity of the signal mast at Octeville. Vessels should run the distance steering either 26° or 206°.

Tidal streams—Petite Rade.—The flood stream begins in the Petite Rade about 1½ hours after the tide has begun to rise in the harbor, or about 4 hours before high water there. Its first direction is 154° for 2 hours, at from 2½ to 3 knots; it then turns to 97°, and the stream becomes imperceptible until high water in the harbor, when it again acquires strength, runs northwest by north, and ends in that direction 1½ hours after. The ebb commences immediately and runs northwest by north for 3 hours, or until 4½ hours after high water in the harbor; it then turns to southwest by west and ends in a southwest by south direction a few minutes before the flood commences.

At the northern entrance to the road the streams follow the same course, but the flood does not end until 2 hours after high water. The ebb runs northwest by north during 2½ or 3 hours, and then turns southwest by west and south by west. When the tide is out in the harbor the ebb runs south by west from 1½ to 2 knots, and it ends in this direction a little before the flood stream commences at this spot, or about 4 hours before high water in the harbor. Vessels running into this road at low water should be aware of this stream of tide when passing the shoal patches.

Grande Rade.—The flood stream begins to be felt in the Grande Rade about 4 hours before high water at Havre. An hour latter it runs south about 3 knots, and continues to run toward the Seine until 2½ hours before high water; its direction is then east by south, losing little of its strength, and then northeast by north. In the latter direction its rate increases to 2½ or 3 knots at the time of high water in the harbor; it then decreases in strength and ends about 2 hours after, running north-northeast.

The ebb commences almost as soon as the flood ends, slack water lasting only about a quarter of an hour at springs. This stream turns round by west, and about 3 hours after high water its direction is northwest by west, but it does not attain its greatest strength of 2½ knots until it runs southwest by west, or about 5 hours after high water; it then slackens gradually as it turns to the southward, where it ends.

Directions—Le Havre approach—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the port of Le Havre are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the north, by St. Vincent steeple, Havre, seen just open of the cliffs of Le Heve; on the south, by a line joining Trouville Church and the West Jetty Lighthouse; on the west, by a meridian drawn 1 mile, westward, from the whistle buoy moored in lat. 49° 30′ N., long. 0° 1′ W. The above limits have not been placed on the chart plates.

Directions—Steamers.—**The main entrance** to Havre for vessels, either from the direction of the Grande Rade or from Carosse Road, was formerly by the Southwest Pass between the Haut de Quarante and the Haut du Sud-Ouest, where the depth is now being dredged to 10 feet.

The new dredged channel carries a depth of 14¾ feet at low-water springs to within about 600 yards of the entrance to the outer port.

It is approached from the westward by day, with the three leading light structures in line, bearing 90° and between lightbuoys on either hand. South Breakwater Lighthouse is in line with South Mole Lighthouse, 111°; steer on this line until about 600 yards from the entrance, then course should be altered to pass between the extremes of the breakwaters forming the entrance to the outer harbor.

By night the leading mark is the three fixed red leading lights in line, 90°, between light buoys with white lights on starboard hand and red lights on the port hand, the white light on South Breakwater is in line with the green light on South Mole, 111°, steer on this line until about 600 yards from the entrance to the outer harbor, when steer to pass midway between the lights on the extremes of the breakwaters forming the entrance. There is no difficulty in entering the basins by night, as they are lighted by electricity.

Sailing vessels.—Although steam navigation is so largely in the ascendant at this port, and even for sailing vessels the services of tugs are always available, yet to those who prefer to enter independently of these aids the following directions will be useful, observing that no stranger should attempt it without a pilot. Vessels arriving off the port some hours before the tide serves should anchor in the Grande Rade.

The stream runs into the Seine from the commencement of the flood until 2 hours before high water; but there is no danger of being drawn into the river if vessels keep westward of the line of Cape de la Heve Lighthouses in one bearing 20°, or if Cape d'Antifer is kept a few degrees open westward of Cape de la Heve; taking care at the same time not to go southward of the line of the Château d'Orcher, which stands near the shore about 2 miles eastward of Harfleur, on with the projecting angle of the wall inclosing the Floride Basin bearing 81°.

With a fresh breeze from west by north round by north to east by south there is no difficulty in turning to windward and keeping a position; but with all other winds, keep as near as possible to the line of the château and the Floride wall in one, because at about 2 hours before high water in the harbor, when the Seine is nearly filled, the flood stream turns to east by south, losing part of its strength, and then to northeast by north. In the latter direction it runs with the same velocity as when it ran up the Seine, and retains it until nearly 2½ hours after high water; should a sailing vessel at that time be so far northward as the parallel of Cape de la Heve, it would be almost impossible for her to reach the harbor in time to get in.

With strong winds from northwest by north round by west to southwest by west, it is necessary to keep under sail at a distance of 6 or 8 miles to windward of the harbor until there is sufficient water to enter; but with moderate winds from southwest by south round by south to northeast by east, during calm weather, or at the times of the freshets of the Seine, it is better to anchor in Carosse Road or between that road and the line of the Château d'Orcher on with the projecting angle of La Floride wall.

Vessels can always get into harbor from the anchorage in the Petite Rade even during light or head winds. When vessels of deep draft have failed in entering, and the direction of the wind and late hour of the tide do not permit a second attempt, they should at once run out of the Seine; but small vessels may take shelter under Hoc Point while the tide is high.

Tidal eddies.—The flood stream entering the Seine, crosses the direction of the entrance channel into Havre at right angles, making great care necessary. even with steamers, and rendering access to the harbor for a sailing vessel very difficult under certain circumstances, which should be understood.

The strength and direction of the tidal streams and eddies at and off the entrance of Havre will probably be considerably modified and changed by the breakwaters of the outer port.

The North Jetty, recently removed, projected into the strength of the flood stream and occasioned an eddy, the strength and extent of which depended on the velocity of that stream and on the range of the tide. About 3 hours before high water when the stream began to acquire its greatest strength, which is 4 or 5 knots at springs, the eddy extended as far as Heure Bay, and forms along the shores of that bay and along the walls of La Floride a rapid counter stream.

This action of the streams continues until about 1½ hours before high water in the harbor, but at this time the Seine being nearly full can no longer receive all the water running toward it from all points of the estuary, the stream here accordingly slackens, while toward the left bank, where the flood follows nearly the same direction as if the Seine did not exist or was barred off, the stream, not finding any issue upward, crosses the Seine obliquely northeastward; this direction, however, soon changes and becomes more northerly as the river fills.

When this cross stream has reached Hoc Point, a portion runs along shore westward and produces the stream named the Verhaule, which, at the entrance of Havre, takes the same direction as the eddy on the flood, just described, and immediately follows it, but in much greater volume, the Verhaule running to the northwest. The effect of these different eddy streams on the flood tide is to raise a high and confused sea at the entrance of the harbor when it blows strongly from the westward.

The Verhaule is in fact the last part of the rising tide, but it runs in an opposite direction to the stream during the first hours of that tide and helps to keep vessels in the entrance channel, thus facilitating the entrance of sailing vessels with westerly winds. Its greatest strength is at about three-quarters of an hour before high water, and it continues to run until high water, when it decreases gradually and is hardly perceptible at the end of slack water. The ebb then commences, and at first is feeble, but in an hour's time it gains strength and runs to the northward and northwest by north in the same direction as the Verhaule when near its end.

It appears therefore that for vessels generally, if intending to remain in the Tidal Harbor, the best time to enter is at high-water slack, but this is rather too late for those entering the basins. They, on the contrary, should enter as soon as the tide serves, so as to have time to secure before the beginning of the ebb. The anchors should be ready for letting go before entering, and one should be placed conveniently for anchoring by the stern; warps and hawsers also should be coiled clear for use on deck and ready to run out in case of need.

The best time of tide for a sailing vessel to enter must, however, depend greatly on the direction of the wind. With a fresh westerly wind she may run in even while the counter stream along the walls of La Floride is at its greatest strength, care being taken to keep in mid-channel so as not to drift on the northern shore.

With fresh winds between southwest by west and northwest by north, the Verhaule causes a violent sea, and it is then best not to enter until the end of slack water, when the sea is rather less confused and the tide slack in the entrance channel.

With the wind sufficiently strong between south by west and east by south to stem the tide, she may enter before the Verhaule commences. Should the wind, however, be between east by south and northeast by east, it is advisable to secure the services of a tug, the arrangements for tracking vessels formerly in vogue having been entirely superseded by towing. Boats are always ready at the entrance and in the harbor to run out warps for hauling the vessel into her berth as may be necessary.

To Havre from the westward.—Generally speaking, in a railing vessel, the direction of the wind met with in the entrance of the channel should determine the choice of the landfall to be made in order to take a fresh departure for Havre. With the wind from northeast by east round by north to southwest by west, the English coast should be made between the Lizard and Portland Bill, but not eastward of the bill, for should the wind then back more to the southward it would be impossible for a sailing vessel to fetch Havre with the flood stream running. As soon as the position of the vessel is ascertained a course should be shaped to sight Cape Barfleur Lighthouse.

Steamers from the southward, in clear weather, generally endeavor to sight Ushant. The points of the French coast which should then be sought for in succession are the high land between Ushant and Ile de Bas; Guernsey, a sight of which assists in making or clearing the Casquets; and, lastly, Alderney and the high land at the back of Cape de la Hague. If this passage is adopted, however, great attention must be paid to the tidal streams when running between the Ile de Bas and Guernsey, as the ship's course crosses their direction nearly at right angles. During the ebb there is no danger, as that stream runs toward the northwest by north, but the flood sets strongly into the Gulf of St. Malo and is very rapid at springs. At 10 miles from the coast, between Ushant and Ile de Bas, the flood or eastgoing stream ends about 2½ hours after high water by the shore.

As Guernsey and the Casquets are approached, the greatest care must be taken to keep well clear of them, the rate of the flood stream between them being from 4 to 5 knots at springs; a vessel should, therefore, always pass well westward and only just within sight of the Casquets. When northwestward of the Casquets follow the directions given at page 377 until eastward of Cape de la Hague to avoid the race of Alderney and the strong tides in that neighborhood, and from thence the course is about 97° to make Cape Barfleur Lighthouse, taking care to keep from 3 to 6 miles from the shore in order to avoid the numerous dangers which border it.

By whatever route a vessel has come, when Cape Barfleur Lighthouse or the high land at Pernelle is made out a course should be shaped to make the land between Cape de la Heve and Cape d'Antifer, or direct for the former cape, according as the wind inclines from the northward or southward. After passing Cape Barfleur and having entered the bay of the Seine the first land seen when steering as described will be that which bounds the estuary of the Seine on Caux should be ahead and on the port bow, terminating toward the coast in chalk cliffs of dazzling whiteness, which, when lighted up by the sun, are plainly distinguished 21 miles distant, and on the starboard hand to the southward will be the hills bordering the left bank of the Seine from Honfleur to the River Dives; their rounded shape, and especially their dark color, distinguish them from those to the northward.

When the meridian of Cape Barfleur is crossed toward the commencement of the flood—that is, about 5½ or 6 hours before high water at Havre—a vessel with a leading wind may arrive off Havre in time to save the tide. On passing the meridian of Barfleur at the commencement of the ebb, or about one hour after high water at Havre, a course should be shaped for Cape d'Antifer and only sufficient sail carried to stem the tide, which, in the middle of the bay, runs 3½ or 4 knots at springs about 4½ hours after high water at Havre. Should the position of Havre be made out before the commencement of the flood, sail must be so regulated as not to arrive off the harbor's mouth until there is sufficient water to enter.

At night, with the wind between north by west and west by south, a course should be shaped from Cape Barfleur to make the land between Cape de la Heve and Cape d'Antifer. The lights on these capes with that of Fecamp are good guides to the vessel's position. To prevent her approaching too near the land it should be borne in mind that Fecamp Light is concealed by the high land at Etretat on a 64° bearing and Cape de la Heve Light by the hills at Bleville when bearing 198°.

Fecamp Light will not be lost sight of at the distance of 1,200 or 1,400 yards off Cape d'Antifer, nor Cape de la Heve Lights at the same distance offshore between Cape d'Antifer and Cauville. Thus, should it be desired to maintain a position during the night by turning to windward between Cape d'Antifer and Cauville, go about, when standing in for the land, the instant the lights on Cape de la Heve disappear, and in standing offshore during the flood tack when Fecamp Light reappears, but during the ebb the offshore board may be continued farther without inconvenience.

With a moderate breeze and smooth water a vessel may anchor on the line of Fecamp Light eclipsed by the land, provided she is some miles southward of the parallel of Cape d'Antifer. The holding ground is excellent as far as 5 miles offshore between that cape and the Grande Rade, but nearer the shore, between Bleville guardhouse and Cauville, the bottom is covered with heaps of large stones for 1.5 miles offshore.

It may be proper here to remark that between Capes de la Heve and d'Antifer, at 4 or 5 miles from the shore, the stream, at springs, runs at the rate of 2 or 3 knots to the northeast by north from two hours before to two hours after high water at Havre; it then slackens and turns more northward, so that a vessel caught by a contrary wind when southward of Cape d'Antifer would be unable during that period to reach Havre by turning to windward close inshore, but she may reach the Grande Rade by keeping at least 4 miles from the coast. During the freshets of the Seine vessels intending to enter Havre must avoid being set northward of the parallel of Cape de la Heve.

When rounding Cape Barfleur with a southwesterly wind from a position about 6 miles northward of that cape haul up 131° or 120° to sight the Ver Light; and when on its meridian keep away two or three points to sight Cape de la Heve Lights and steer for the anchorage in the Grande Rade; or, with a pilot on board, Havre may be steered for if the tide serves, and sail so regulated as not to arrive off the harbor's mouth until there is sufficient water to enter. With a head wind long boards should be made across the Bay of the Seine by day as well as by night, recollecting that the flood stream setting up the Seine ends in the bay nearly 2½ hours before high water at Havre.

To Havre from the Eastward.—In clear weather, with the wind between north by west and east by north, the Pas de Calais Channel between the Ridge bank or Colbart and the French coast may be taken, and from thence a 218° course leads between the Bassurelle and Vergoyer banks direct for Cape d'Antifer; Fecamp Light will probably be seen before Cape d'Antifer Light in following this course, and is a good guide at night. This channel is also used in fine weather when the wind is between south and east, keeping 4 or 5 miles from Cape Gris Nez, and passing outside the Bassure de Baas bank. When southward of the River Somme and westward of the meridian of Dieppe the shore may be neared if necessary, but, should the wind veer to southwestward, a vessel should quit the French coast immediately, and, if it increases to a gale, seek the sheltered anchorage in Dungeness East Road.

With the wind from northwest by north round by west to southwest by west the Dover channel between the Varne and the English coast should be used. From Beachy Head, Cape de la Heve bears 185° 73 miles, and the passage with westerly winds is made more advantageously on the ebb than on the flood; vessels, therefore, having held their own to windward, and in sight of Beachy Head Lighthouse to the end of the flood, should then stretch across so as to arrive abreast of Cape d'Antifer at the beginning of the following flood and in time to enter Havre at high water. Either Fecamp or d'Antifer Lights are excellent guides for the landfall on the French coast, and in clear weather the latter may be seen in a 15-miles run after Beachy Head light has been lost sight of.

Tancarville Canal.—The Tancarville Canal connects the Bassin de l'Eure and Bassin Zellot at Havre with the little port of Harfleur, 3½ miles to the eastward and with the river Seine at Tancarville, its total length being about 13 miles. In the first section between Havre and Harfleur the dimensions are, depth, 19 feet; width at bottom, 62 feet; width at surface, 162 feet. In the second section, between Harfleur and Tancarville, depth, 11½ feet; width at bottom, 81 feet; width at surface, 168 feet. Seagoing vessels for the first section and for the branch leading up to Harfleur must not exceed 46 feet beam; those for the second section, 36 feet beam. Trains of barges in tow through the second section and bound for the Seine and inner navigation must not exceed 36 feet beam, or a total length of 558 feet.

The smallest of the three locks at the Havre entrance of the canal is the central lock; it is 590 feet long and 98 feet wide; the entrance gates of all have a uniform width of 52 feet, with 19½ feet over the sills. The lock communicating with the Seine at Tancarville is of the same dimensions as the smallest lock at Havre, but its eastern sill is 1 foot 9 inches above the zero of soundings; its western sill 6 inches below that zero. Vessels drawing 7 feet can enter or leave the Tancarville lock, at springs, from 1 hour before to 4 hours after the time of high water at Havre; at neaps, from 2 hours before to 4 hours after high water at Havre. The channel between the lock and the Seine is maintained approximately at the zero depth.

From a point bearing 211°, 150 yards, from the abattoir clock tower a drain, indicated by piles, discharges into the Rive Nord; it extends for about 80 yards in a 149° direction; the outer end uncovers 8 feet at low water and is not buoyed.

Small craft or boats who make use of the Rive Nord when between the meridian of Fort de l'Eure and the Forges et Chautiers, should not approach within 300 yards of the shore.

Harfleur.—This little port is on the River Lizarde which formerly ran into the Seine near Hoc Point, but now flows into the Tancarville Canal, westward of the artificial cutting which forms the port and connection with the canal, and which is maintained at a depth of 19½ feet, with a bottom width of 62 feet. It has a quay 110 yards in length, where vessels of 18 feet draft can lie alongside, but its proximity to Havre causes its trade to be quite insignificant.

Heure Bay.—Between Havre and Hoc Point, the shore and adjacent land of the estuary of the Seine is low, but defended against the sea by an artificial embankment abutting the wall which incloses the southern part of Havre as far as the middle of Heure Bay, and from thence to Hoc Point by a high, natural beach of shingle. Heure Bay seems to have been hollowed out by the violent eddy during the flood previously described, and is filled with shingle cemented together with mud, which uncovers from 9 to 13 feet at low water. In bad weather, whatever the direction of the wind, the sea breaks directly on the shore during the flood, and any vessel then missing the entrance to Havre and driving on shore in this bay would to a certainty be totally wrecked.

Hoc Point.—This low point, composed of a mass of rolled shingle, is 3.5 miles eastward of Havre and 1.5 miles 187° of Harfleur. It may be recognized by two large houses built to serve as a lazaretto, by the old, disused light tower still maintained as a landmark, and by a guardhouse about 200 yards from it. The point projects considerably from the shore and occasions a strong eddy during the flood. This eddy stirs up the sand and hollows out a deep, the extent and depth of which are variable, but small vessels intending to ascend the Seine may lie aground without danger, sheltered by the point, and await a favorable tide. The bottom in this deep is sand and shingle, and vessels are moored securely as near as possible to either of its sides. The eddy on the flood is troublesome and the ebb stream very rapid.

A good anchorage to await tide may be found 200 yards from the shore southwestward of Hoc Point, with Harfleur steeple seen between the two warehouses of the lazaretto, but it is not safe for vessels to go there before three hours flood nor to remain there after three hours ebb. These anchorages have, however, lost their importance since the entrance to Harfleur ceased to be by way of Hoc Point.

The Coast.—From Cape de la Heve, the coast trends about 19° 11 miles to Cape d'Antifer, and consists of chalk cliffs with strata of flint from 320 to 370 feet high, which, with onshore winds, have no accessible spot. Between Cape de la Heve and the little valley of St. Jouin, 8.5 miles farther northward, the crown of the cliffs only is perpendicular, enormous masses of flint shattered down from the cliffs above being banked up against them. It is supposed that the action of the sea causes a constant movement of these masses southward along the coast, and that they have largely contributed to form the banks southwestward of Cape de la Heve, which obstruct the approaches to Havre and the Seine. Northward of St. Jouin, the cliffs, including Cape d'Antifer, to be described with its lighthouse and semaphore in the next chapter, are quite perpendicular, the sea washing their base, and in the afternoon when lighted up by the sun their brightness is so dazzling that they may be seen 21 miles distant.

Tidal streams.—The peculiarities of the tidal streams in the Baie de la Seine and the tendency of the flood stream of the Baie acting in conjunction with the channel flood streams to cause the Bore in the River Seine have already been fully described. It only remains here to remark that the estuary of the Seine being the point toward which these streams flow, it quickly fills, and the water within having attained the level of that without, the streams cease running toward the estuary and take a northeast by east and northeast by north direction for the remaining two hours of the east-going channel stream, as described with reference to Havre Grande and Petite Rades. The stream, in fact, then takes the direction it would have naturally followed from the commencement of the tide if the Seine had not existed.

The ebb or west-going stream in the interior of the bay, when at its greatest strength, runs in the opposite direction to the flood; but, northward of the line drawn from Cape Barfleur to Cape d'Antifer, its direction is west. The windings of the coast modify the direction of both streams near the shore, and behind each projecting point there is an eddy depending on the strength of the tide for its extent.

During springs the east-going is more rapid than the west-going stream. The former commences suddenly and is not long in gaining strength; the latter, on the contrary, is slower in establishing itself. When stream and wind are in the same direction the rate and duration of the stream is increased in proportion to the strength of the wind, but when the wind blows from a direction opposite to the stream it has little effect on it.

Table showing the direction and rate of the tidal streams at certain times of tide, during ordinary springs, from Cape Barfleur to Cape d'Antifer.

Positions and tidal stream.	Time with reference to high water at Havre.[1]	Direction.	Rate.	Duration at the rate given.
92° 11½ miles from Cape Barfleur:	*h. m.*		*Knots.*	h. m.
Flood	2 45 before	131°	4.6	1 30
End of flood	0 45 after			
Ebb	3 40 after	311°	4.3	2 0
End of ebb	5 20 before			
47° 43 miles from Cape Barfleur:				
Flood	1 50 before	92°	3.5	0 45
End of flood	1 30 after			
Ebb	5 10 after	266°	3.3	0 45
End of ebb	4 40 before			
97° 10 miles from Port Barfleur:				
Flood	3 0 before	142°	4.4	1 30
End of flood	0 25 after			
Ebb	3 25 after	322°	4.2	2 0
End of ebb	5 15 before			
97° 8 miles from St. Marcouf Islands:				
Flood	2 20 before	142°	3.5	4 45
End of flood	0 30 after			
Ebb	4 0 after	322°	3.0	1 0
End of ebb	5 5 before			
334° 8 miles from Ver Lighthouse:				
Flood	5 15 before	126°	3.5	2 30
End of flood	0 50 after			
Ebb	4 0 after	289°	3.2	
End of ebb	4 50 before			
41° 7 miles from Ver Lighthouse:				
Flood	2 30 before	75°	3.0	
End of flood	0 55 after			
Ebb	4 30 after	300°	2.8	
End of ebb	4 45 before			
13° 11 miles from the entrance of the River Orne:				
Flood	2 40 before	120°	3.5	
Do	2 0 before	97°	3.0	
Do	1 30 before	64°	3.5	
End of flood	1 0 after			
Ebb	4 30 after	300°	3.0	
End of ebb	4 45 before			
At the entrance of the southern channel to Honfleur:				
Flood	3 30 before	64°	4.0	
Do	1 30 before	41°	1.0	
End of flood	0 50 after			
Ebb	3 30 after	255°	3.8	
End of ebb	5 0 before			
In the southern channel to Honfleur, between Vasoui and the Falaise des Fonds:				
Flood	3 0 before	75°	7.5	4 0
End of flood	At high water			
Ebb	1 0 after	300°	3.0	
Do	5 0 after	266°	6.5	
End of ebb	5 20 before			
300° 18 miles from Cape de la Heve:				
Flood	2 25 before	86°	3.5	1 30
End of flood	1 25 after	30°	.3	
Ebb	4 30 after	289°	3.3	1 30
End of ebb	4 30 before	322°	.2	
356° 6 miles from Cape de la Heve:				
Beginning of flood	3 45 before	187°	.6	
Flood	3 30 before	131°	.4	
Do	3 0 before	75°	1.4	
Do	2 0 after	19°	2.2	
End of flood	2 30 after	322°		
Ebb	5 0 after	232°	1.8	
End of ebb	4 0 before			
322° 15 miles from Cape d'Antifer:				
Flood	1 30 before	75°	4.0	
End of flood	2 0 after			
Ebb	5 0 after	266°	3.5	
End of ebb	4 0 before			

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[1] High water at Havre occurs about 2 hours before high water at Dover.

CHAPTER XI.

CAPE D'ANTIFER TO CAPE GRIS NEZ.

Aspect of coast.—Cape Gris Nez bears from Cape d'Antifer 37° 89 miles, the coast between forming a bight to the southeastward, about 105 miles in circuit and receding 24 miles from a line connecting the two points. The high cliffs of chalk and flint, described in the preceding chapter, extend from Cape de la Heve to within about 4 miles northeastward of Treport, near the town of Ault, and beyond them commences a low coast fronted by a sandy beach on which three wide valleys open out and give issue to the waters of the rivers Somme, Authie, and Canche. This low coast extends to within about 4 miles of Boulogne; the land then rises abruptly and the shore continues steep, with a few exceptions, as far as Cape Gris Nez. The harbors between Capes d'Antifer and Gris Nez, with the exception of Fecamp, Dieppe, and Boulogne, dry at spring tides and are inaccessible to vessels of deep draft at neaps.

The cliffs between Cape d'Antifer and Ault are precipitous, their feet resting upon a narrow shelf of rock covered at all times of tide. The ports of Fecamp, St. Valery-en-Caux, Dieppe, and Treport, at about equal distances from each other, are at the entrances of wide valleys forming breaks in the line of cliffs. The land crowning the cliffs is for the most part level in its whole extent, but the monotonous aspect of the coast is varied by towns and villages near the sea and by the verdure of the sides and bottoms of the valleys, which contrasts strongly with the uniform white of the cliffs. As the openings of all the valleys are dissimilar in some points, it is easy to distinguish them from each other, even from a considerable distance in the offing.

The cliffs remarkable for their height are that of Fagnet Point, the northern point of entrance to the valley of Fecamp, on which stands a chapel dedicated to Notre Dame du Salut; the Butte du Catellier, with a small mound on its summit, which forms the western side of the Pallud, a wide valley watered by the Durdent River; the cliff of St. Leger, ¾ mile westward of St. Valery-en-Caux, marked by a church tower and spire, the only remaining parts of the church; the cliff of Stotteville, rendered remarkable by a large guardhouse and a heavy-looking church tower overtopping a row of trees; and the cliff at Criel, 3.5 miles southwestward of Treport, which is the highest of all and is surmounted by Mont Joli-Bois, a large mound covered with heath.

Caution.—When hugging the coast with offshore winds, vessels must be on their guard against the squalls which rush down the valleys; the most violent are felt abreast of the openings, which do not reach down to the beach.

The entrances of the Rivers Somme, Authie, and Canche are in the lowland which extends over a space of 35 miles, from ½ mile northeastward of Ault to the foot of the hills, of which the most western parts form Cape Alprech; they are all obstructed by banks of shifting sand, which extend far outside their openings and dry at low-water springs.

Approaching the coast.—The shore between Cape d'Antifer and Point d'Ailly, about 5 miles westward of Dieppe, is without danger, and large vessels may coast it at a distance of 1.5 miles, but eastward of this point the approach to the shore is dangerous for vessels of deep draft, for from the meridian of Point d'Ailly to that of Treport are banks of sand and shells, called ridens, or ridges, some of them lying as much as 11 miles from the shore; and eastward and northward of these is the shoal bottom forming the base of the shifting sands obstrucing the mouths of the Somme, Authie, and Canche Rivers, which extends even northward of the latter.

Outside these shoals and toward the middle of the channel are several long submarine sand banks converging in direction toward Cape Gris Nez. These banks lie generally about northeast and southwest, nearly in the direction of the tidal streams, but the ridens lie northwest and southeast in a direction perpendicular to the banks and consequently across the streams. The greater part of these ridens need be avoided only on account of the eddies they occasion, but there are spots with only 2 or 3 fathoms on some of the ridens and on several of the banks, which are therefore very dangerous for large vessels at all times, while some are so only at low water.

During spring tides the eddies are very strong at the steep edges of these banks and ridens, and in bad weather or with a fresh breeze on a weather tide small vessels crossing them subject themselves to a dangerous sea.

Caution.—During strong winds from southwest by west round by west to northwest by north the coast eastward of Point d'Ailly is dangerous to be near, and shipwrecks are of frequent occurrence; vessels therefore of every description at such times should keep a good offing, and when obliged to approach the shore must do so with great caution, for although the general mass of the bank described appears to be stationary, great attention should be paid to the lead and to observing the confused state of the sea in the various eddies, so as to guard against meeting suddenly with dangers which may be of recent formation. The lights indicating the positions of headlands and dangers on and between Capes d'Antifer and Gris Nez are so disposed that at night in clear weather two can always be seen at a time, and all the harbors show tide lights whilst there is sufficient water for them to be entered.

It is important to notice that near the shore, between Cape de la Heve and the town of Ault, a space of 67 miles, the wind, when it blows in a direction perpendicular, or nearly so, to the direction of the coast line, does not blow home, but is deflected by the cliffs, and its effect is to a certain extent neutralized for some distance toward the offing. Thus, except in front of the wide valleys where the direct wind meets with no obstacle, a zone is formed off and parallel with the shore, where the wind is light but the sea much agitated and the waves run toward the shore. On the other hand, when the wind forms an acute angle with the coast, the deflected wind tends to increase the force of the direct wind near the shore.

Cape d'Antifer, as already noticed, differs but little from the adjacent land, except in the change in direction of the coast line which there takes place. The cape is rounded and terminates in a perpendicular chalk cliff 320 feet high, of which the foot is washed by the sea; in clear weather it may be seen 21 miles distant.

Light.—From a cylindrical yellow lighthouse, 85 feet high, erected near the extreme of Cape d'Antifer, and at an elevation of 394 feet above high water, a powerful flashing white light is exhibited, visible 27 miles.

Fog signal.—From the upper gallery of the lighthouse, in thick or foggy weather, a siren is sounded.

Semaphore.—There is a semaphore station a short distance northward of the lighthouse.

Telegraph cable.—A telegraph cable leaves the shore on the northern side of Cape d'Antifer and crosses the channel to Beachy Head.

Vessels of any draft may approach to within 400 or 600 yards of Cape d'Antifer without danger, even at low water. From Cape d'Antifer the coast trends about 64° 9 miles to Fecamp and may be approached to about 800 yards.

Beacons.—Two beacons, painted with white and blue horizontal bands and having white round top marks, have been erected in the bay between Courtine Point and Petit Antifer to mark the shore end of the telegraph cable. The front beacon is situated on the edge of the cliff close to the coast-guard station; the rear beacon is distant 110 yards 156° from the front beacon.

Etretat, a large fishing village and fashionable watering place, with a standing population of about 2,000, is on the shore at the entrance of a wide valley open to the northwestward and has railway accommodation with Fecamp. The houses are built on low land, defended from the incursions of the sea by a natural high shingle beach, up which the fishermen heave their boats out of reach of the surf by means of capstans. The beach is backed in the neighborhood of the casino by pavement in masonry.

The cliffs both eastward and westward of Etretat are very remarkable. They form sharp projecting points with openings in them resembling arches and doorways. About 100 yards southwestward of the point and westward of the village is the Aiguille d'Etretat, a high rock, or rather the remains of fallen cliff, so named from its pyramidal form. The eastern part of the beach at Etretat is bordered by rocks which uncover at low water.

Abreast of Etretat the shoal bottom, with less than 8 fathoms, extends a mile offshore, and when the flood stream is at its greatest strength a great eddy, named by local mariners the Hardiers, is formed and extends eastward as far as the Vaudieu Rock, making the sea hollow and heavy when the wind is fresh from the eastward.

Between Etretat and Iport, at 1.5 miles from Etretat Point, called also the Port Orientale, and less than 200 yards from the cliffs, is the Guillemot Rock, which resembles a ruined column and rises 160 feet above the rocks which uncover along the shore. Halfway between this rock and the Port Orientale, but a little nearer the cliffs than the Guillemot, is the great Vaudieu Rock, about 50 feet high at low water, with a 1-fathom patch just outside it. These two rocks, like the Aigulle d'Etretat, seem to be the remains of ancient cliffs. The base of the Guillemot is so worn by the sea that it is probable it may fall ere long.

Iport, a fishing village and watering place, 4.5 miles eastward of Etretat and 235° 2.5 miles from the entrance to Fecamp, stands, like Etretat, at the entrance of a valley on low land near the sea, and is sheltered by a natural high shingle beach, strengthened by a small stone jetty, with a beacon at the end, and sea wall of masonry. The beach in front of the village is encumbered by rocks which uncover at low water, and is not accessible to fishing boats until after the first hour's flood. The bluff point of Chicart with the rocks at its foot, affords a little shelter to the beach against westerly winds, but it is quite open northward, and when the sea is high the boats are hauled up on the beach.

Harbor lights.—The channel leading to the grounding place at Iport is indicated by two small fixed white lights, maintained by the town, which should be kept in line.

A lifeboat is stationed at Iport.

Fecamp, with a population of about 15,381, is a commercial, fishing, and refitting port of some importance; it is 9 miles eastward of Cape d'Antifer, at the entrance of a fine valley watered by the Rivers Valmont and Ganzeville. It consists of an Avant-port or tidal harbor, and two Bassins-a-flot or wet docks. The Avant-port is divided into two distinct parts, the older portion forming the approach to the Berigny Dock; the other, called also the Gayant tidal basin, forms the channel to the half-tide basin and to the Bassin Freycinet.

The entrance is open to west-northwestward and is between two stone jetties at the foot of the high cliff forming Fagnet Point. The jetty heads bear 13° and 193° from each other and are 76 yards apart; the channel between them is about 350 yards long, and narrows somewhat toward the inner end. The south jetty extends from the natural high shingle beach which shelters the harbor, and arresting the progress of the shingle along the coast from the southwest, compels it to take a direction outward from the entrance. The north jetty, 540 feet long, is built on the rocks which uncover at the foot of Fagnet Point, and forms a continuation of the quay on the northern side of the harbor.

The depth in the entrance channel is always greater than inside the harbor, and dredging is in progress by which, assisted with flushing, it is hoped to maintain a depth of 5 feet below the zero of soundings. The actual depths at high-water springs, as reported in 1895, were: In the channel, 31 feet; at the Berigny Dock gate, 32 feet; in the Berigny Dock, 23 feet; in the Avantport generally, nearly 30 feet. At dead neap tides 6½ feet should be deducted from these for the high-water depths. Only a very small portion of the Avantport dries 2 feet at the lowest tides, but the channels through have the depths named. The port accommodates with ease steamers 320 feet long with a draft of water of 21 feet.

The backwater of Fecamp is very powerful for scouring out the channel when required, and it can be done both through the Gayant Tidal Basin and the Berigny Dock. The sluices can always maintain the channel leading up to the lock gates of the Berigny Dock, which, like the entrance channel, was originally deepened by removing the rocky bottom to a depth of 6 feet below the lowest tides; it is the bed of sand which forms in the entrance channel over this rocky bottom that has to be removed when necessary by dredging.

Tidal harbor.—The Avantport, forming the approach to the Berigny Dock, is 350 yards long north-northeast and south-southwest by 200 yards wide. A high and strong natural dike of shingle cemented with mud forms its western side; its other sides are bordered by quays, which are, however, not much used except by fishing boats, as a fresh westerly wind causes sufficient surf to distress vessels moored along them. Several white warping buoys are moored in this harbor. The bottom for the most part is a mixture of chalky mud, sand, and gravel, and affords a tolerably good bed for grounding on.

The Gayant Basin communicates directly with the entrance to the port by a passage 97 feet wide. Vessels lie here in perfect safety on good soft berths alongside its quays, and a channel of 5 feet depth at the lowest tides has been dredged up to the sill of the half-tide basin, which puts the Gayant Basin in communication with the new Bassin-a-flot.

The Berigny Dock is southeastward of the Avantport and southwestward of the Gayant Basin. It is 415 yards long in a 114° direction from its entrance and 99 yards wide; the bottom is of gravel cemented together by mud. It is surrounded by quays on which are steam cranes traveling on rails and all conveniences for loading and unloading. It communicates with the Avantport by a lock 52 feet wide, with 30½ feet over the sill at high-water springs.

The Freycinet Bassin is 164 yards in length, with an average width of 109 yards. It is entered from the Gayant Basin by half-tide basin 208 yards long and 76 yards wide, both of whose gates have a width of 58½ feet, and the sills have the same depth over them as the Berigny Dock.

The new dock, called Bassin Freycinet, has been completed (1913), but the new part is of no use for commercial purposes. The quay walls being inclined to an angle of 45°, only a few narrow landing places permit of communication with the land. This part of the dock will only be used by the fishing boats for their wintering season.

The dredging of the harbor is nearly finished (1913).

One of the landing places for wood at the end of the Bassin Berigny was filled up, and a straight quay wall built in its place.

A patent marine slipway of the longitudinal type of the Morton system was to be built in 1913.

The quay wall of the tidal harbor will be rebuilt 10 feet outside the old one to permit the dredging, so that the herring boats will float at low water instead of being aground.

The railway station is at the head of the Berigny Dock; it unites with the main line for Paris at Beuzeville. Fecamp is also now in communication with Etretat by rail. Havre is distant about 24 miles by road, but Fecamp has no regular steam communication by sea with any port. It has large fish-curing establishments and building yards, where the Newfoundland and other deep-sea fishing craft are constructed, as also a gridiron 165 feet long, with a depth of 18 feet on blocks at high water, but no dry dock. Repairs to vessels, both wood and iron, can be effected, but only very moderate repairs to machinery. This port is capable of receiving the largest class of shipping, but its trade is comparatively insignificant. The exports are chiefly oil cake, clay, salt, flints, cod, etc.; the imports, coal, timber, wheat, rapeseed, ground nuts, salt, etc. There is a good hospital here available for seamen in cases of illness.

Coal is always to be obtained, the average stock on hand being about 5,000 tons. Vessels coal either in the Berigny Dock or in the Gayant Basin, and about 300 tons can be put on board in a day.

Patent fuel is also obtainable in small quantities.

Semaphore.—There is a semaphore station on Fagnet Point situated about 500 yards eastward of the harbor entrance.

Lights—North jetty.—From a white cylindrical tower 37 feet in height at the end of the north jetty, at an elevation of 47 feet above high water, is exhibited a group-flashing white light. The light is visible 12 miles.

A green light, obscured seaward, is also shown from the South Breakwater; and, within the piers, the northern side of the channel is marked by red lights and the southern side by green lights.

Fog bell.—During thick or foggy weather a bell at the end of the north jetty is sounded. It is only sounded by day when the tide is 10 feet above the zero of the chart, and by night from three hours before to three hours after high water.

South jetty—Tidal light.—From a white masonry turret, 34 feet in height, at the head of the south jetty, a fixed light is exhibited at an elevation of 45 feet above high water, which shows white from three hours before high water to two and a half hours after high water; green at other times. The white light is visible 9 miles, green light at 4 miles; it is obscured landward of the bearing 72°.

Lifeboats.—Two lifeboats are stationed at Fecamp, and there is a mortar apparatus with life lines, etc., on each jetty.

Tides.—It is high water, full and change, in Fecamp Harbor at 10h. 47m.; springs rise above the zero of soundings 25½ feet; neaps 20¾ feet, which is about 1¾ feet below the level of low water, ordinary springs. Strong westerly winds for several successive days raise the tides 1 or 2 feet higher in the harbor, but cause a heavy sea at the entrance; the contrary is the case with easterly winds. The streams do not run with any great strength, and it is nearly slack water outside at the time of high water in the harbor; the duration of slack water in the harbor is not more than 15 or 20 minutes at the utmost.

Harbor signals.—The following signals are also made from the tidal signal mast:

1. By day, a red and white checkered flag; by night, two red lights, vertical, prohibit entrance in consequence of the departure of another vessel.

2. By day, a green flag; by night, two green lights, vertical, prohibit departure and movement in the outer port in consequence of the entry of another vessel.

Pilots.—Four qualified pilots are stationed at Fecamp; they have decked boats which can keep the sea in any weather; their limits are Saint-Jouin to the southwestward and Veulettes to the northeastward.

Directions—Fecamp approach—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the port of Fecamp are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the north, by the alignment of Fecamp Abbey and the North Jetty Lighthouse; on the south, by the coast; on the west, by the arc of a circle described with the North Jetty Lighthouse as center with a radius of 2 miles. The above limits have not been placed on the chart plates.

Light.—A red light is shown from the pilots' quay as a guide for vessels entering.

Fecamp Harbor is not generally difficult to enter, but it is dangerous when it blows strongly from the westward on account of the heavy sea off the entrance, for should a vessel then miss the harbor and ground on the rocks off Fagnet Point she would be totally lost. If the weather is doubtful, look out for the signal as to whether the harbor is practicable; and, if not, haul off at once. A tug is stationed at the port and every assistance is given to warp or track vessels in or out, boats and men being always ready at the entrance when the weather permits.

Vessels arriving off the harbor toward low water. with the wind between southwest by west and west by north, should steer for the land about Etretat, and keep to windward of the harbor until the tide serves to run in. With the wind between northwest by north and northeast by east, the land should be made about Vattetot and Iport, and if the wind should come offshore and there is a chance of losing the tide, anchorage may be found about 1.5 miles from the coast near the meridian of Iport in 10 fathoms water, and tolerably good holding ground with the Aiguille d'Etretat in line with the Porte Orientale and the bell tower of the abbaye at Fecamp on with the last slope of the hills a little southward of the houses of the town. On arriving only two or three hours before high water, a vessel might anchor closer inshore, but in such a position that she may be able to fetch the entrance of the harbor. These anchorages, however, are only good for a few hours, unless the weather is quite fine.

Sailing vessels should endeavor to enter Fecamp Harbor about an hour before high water, at which time the eastern stream is running across the jetty heads at the rate of about 1½ knots, so that in approaching the entrance on the starboard tack a vessel requires to be well to windward or she may fall to leeward of the north jetty and miss the port. With a fair wind, or when close-hauled, sufficient sail should be carried to get quickly into harbor, and it should be so balanced that the vessel answers her helm well. In heavy weather the worst sea is from 250 to 350 yards outside the jetty heads. With the wind from northwest by west or northeast by north, squalls and baffling winds, caused by the high lands, are very apt to occur when in the entrance channel.

The method generally adopted when entering the harbor with a fair wind without the tug is to stand fairly in between the jetties, then clew up, and the vessel will be tracked up to her berth. If not intending to enter the Berigny Dock, the harbor need not be entered before high water.

Caution.—Care must be taken on quitting Fecamp Harbor with a westerly wind to avoid being drifted by the flood stream on the Charpentiers Shoals, which join the rocks at Fagnet Point and extend westward as far as the line of St. Leonard's spire on with the north jetty head 185°. To pass well outside the swell caused by these shoals, keep Grinval Valley open, so that the new guardhouse may appear above the middle of the cleft by which the descent is made to the beach.

The coast from Fecamp trends 58° 10 miles to Butte du Catellier and then east 5 miles to St. Valery-en-Caux, and consists of the high, perpendicular cliffs of chalk and flint, before described, intersected by numerous valleys, of which the greater part do not reach down to the level of the beach. A shelf of irregular rocks, which uncovers at low water, borders the shore, but no part of it projects farther than about 600 yards from the cliffs, so that large vessels may approach within ½ mile of the shore at any time of tide.

The appearance of this part of the coast is dull and uniform; the land seen above the cliffs is apparently level and only varied by occasional clumps of trees surrounding farms and villages. Above these trees occasionally appear church towers, the most conspicuous being those of Senneville, Sassetot, St. Martin-aux-Bunaux, Conteville, and

St. Leger; the last named stands near the edge of the cliff ¾ mile westward of St. Valery, has a tall, isolated spire, and may be seen from a great distance in the offing.

St. Valery-en-Caux, a town of 3,200 inhabitants, has a small bar harbor and is at the entrance of a narrow valley between high hills. It is the terminus of a branch railway, which puts it in communication with the general system of the country; its trade is, however, small. Mackerel, herring, and cod fisheries are carried on, the port sending three ships to the Newfoundland fishery, and coal, Baltic and Norway timber, wine, brandy, etc., are imported, vessels usually leaving in ballast. The principal trade is the export of a particular kind of flints. There is a small patent slip here.

Entrance channel.—The port consists of a channel between two jetties of unequal length leading into a small tidal harbor and of a reservoir for backwater, a part of which serves as a wet dock. The western jetty is 377 yards long, including 129 yards of open pile work. The eastern jetty is 296 yards long, but it is prolonged seaward about 220 yards by a breakwater. The jetty heads bear from each other about 289° and 109° 100 yards, but the width between the jetties is only 65 yards at the outer part and 40 yards at the inner. The width of the navigable channel is still further reduced by the vast mass of shingle which collects inside the channel against the west jetty, leaving a space of only about 22 yards, and this space is with mass of shingle that collects inside the channel against the west

The tidal harbor is 3½ acres in extent, being about 220 yards long and 80 yards wide, and has quays on both sides, as well as a small building and repairing slip for fishing craft. The bottom is soft and good for grounding, but strong northly winds send in so much sea as not only to break vessels away from their moorings but also to make it unsafe to open the lock gates into the wet dock. Vessels in the tidal harbor should be placed parallel with the quay, and the moorings watched as the scouring sluices are opened, for the rush of water is so violent as to undermine those which have grounded at right angles or diagonally to its direction.

Depths.—The depth varies greatly according to the state of the bar, but as a rule 20 feet at high water, springs, and 13 or 14 feet at neaps, is the average depth through the entrance channel and tidal harbor up to the entrance of the wet dock, though this depth is by no means reliable in the very narrow inner part of the channel described. The berths alongside the quays of the tidal harbor have only 14 feet over them at high water, springs, and 6 or 7 feet less at neaps.

The wet dock or Bassin-a-Flot is a part of the flushing reservoir, 6 acres in extent, the whole reservoir being 17¼ acres; it communicates with the tidal harbor by means of a small lock 138 feet long, with sluice gates 30½ feet wide; its sill is dry at low water and has over it 24 feet at high water, springs, and 18½ feet at neaps.

The valley of St. Valery, of which the town and harbor occupy the entrance, is about 400 yards wide, and is at the head of a small bight in the coast. The rocky ledge which uncovers at the foot of the cliff along the shore has a natural opening through it in front of the valley, and the space between consists of a beach of chalky mud and cemented shingle 500 yards wide, on which shingle, always working along from the westward, is deposited. The channel leading to the harbor runs through this beach, and its direction when between the jetties is about north and south.

Bar.—The beach uncovers, during springs, 200 yards outside the western jetty, and the shingle borne from the westward forms on it a bar in front of the entrance, one end of which sometimes joins the west jetty head, but generally leaves a channel from 40 to 50 yards wide between it and that jettey head. The scouring water not having force enough to open a passage through the bar runs out generally by its eastern end. The bar rises if westerly winds continue, and a southwesterly gale brings an enormous mass of shingle on the beach; the higher the bar the more it extends northeastward, forcing the outer part of the channel eastward. When strong easterly winds blow for any length of time, the surf drives the shingle from the entrance, lowering the bar and dividing it into several parts, and then by copious flushings the channel is sometimes completely cleared.

Lights—West jetty.—From a white masonry tower 33 feet high at the west jetty head is exhibited, at an elevation of 43 feet above high water, a fixed and flashing white light, the bright flash lasting 2 seconds. In clear weather the fixed light is visible 9 miles, the flash at 12 miles.

East jetty.—A fixed red light, elevated 23 feet above high water, and visible 3 miles, is shown from an iron tower painted white on the east jetty head.

Fog signals.—At the west jetty head, in thick or foggy weather, a bell is sounded. A double stroke sounded in the middle of each interval denotes that there is a depth of 8½ feet or more in the entrance channel.

Lifeboat.—There is a lifeboat, mortar apparatus, and other life-saving appliances, at St. Valery-en-Caux, in case of shipwreck.

Pilots.—Three qualified pilots are stationed at this port; they have, however, only open boats, and therefore can not always get to sea, but considering the varying depths and shifting nature of the bar, it need scarcely be said that no stranger should enter without a pilot. When the state of the sea prevents pilots boarding vessels outside, they attend on the jetties to signal the direction to be followed in order to round the bar and enter the channel.

Semaphore.—There is a semaphore station on the highest and most prominent point of the coast nearly a mile westward of the entrance to St. Valery-en-Caux.

Tides.—It is high water, full and change, at St. Valery-en-Caux at 10h. 46m.; springs rise 27 feet above the level of the soundings, neaps 21½ feet. With fresh westerly winds, the water is from 1 to 2 feet higher, and with easterly winds a foot or two lower than the ordinary rise.

During springs when the outer shingle banks are all covered, the flood stream forms a great eddy in the elbow eastward of the jetties which runs westward along the shore of the elbow and along the outer side of the eastern jetty. This eddy, named the Sciade, much resembles the Verhaule at Havre; a part of it after rounding the east jetty head enters the entrance channel, while the principal portion, crossing the channel obliquely, runs along the west jetty and rounds its head as soon as the flood stream outside slacks, which takes place about a quarter of an hour before high water. The eddy is usually more rapid with westerly than with easterly winds, and with the former when at its greatest strength, shortly after high water, it assists to keep vessels in the channel. The eastgoing stream continues to be felt at a short distance outside the jetties for more than half an hour after high water in the harbor, and is a great inconvenience when entering with westerly winds, or when the sea is high, if the entrance round the west jetty head happens to be closed and it is necessary to round the bar well to the eastward to get into the entrance channel.

Directions.—Vessels unable to enter St. Valery-en-Caux Harbor during neaps must keep at sea until springs, except with offshore winds in fine weather, when they may anchor from 1,000 to 1,600 yards offshore, between the guardhouse at Cinq Trous and St. Leger, in a depth of from 5 to 10 fathoms, tolerably good holding ground. Arriving off the entrance at springs, with only a few hours to wait for sufficient water, they should, with westerly winds, make short boards between Butte du Catellier and St. Leger, or if the wind is from the eastward they should maintain a position off the harbor. When standing inshore, eastward of the entrance, care must be taken to keep Butte du Catellier well open northward of the point formed by the cliffs near Sussette Valley in order to avoid the Ridens, dangerous banks of sand and gravel 52° 1,600 yards from the West Jetty Head, on which there is but a depth of 2 feet at low water and a high sea during a weather tide.

With a pilot on board there is no difficulty in entering the harbor, provided the entrance channel runs at the foot of the West Jetty Head, where there is generally sufficient water at about 20 yards from the head half an hour before high water, and if the wind does not admit of sailing in between the jetties a vessel will be tracked in by men always in attendance; but it is difficult of access when the bar joins the West Jetty Head, and the only channel open is northward and eastward of the bar.

The most favorable moment to enter with westerly winds is when the sciade or eddy is at its greatest strength; that is, from half an hour before to half an hour after high water; the anchors should be clear and sufficient sail carried for the vessel to answer her helm quickly. With winds between north and east it is advisable to enter before the sciade has acquired its full strength for fear of being drifted on the West Jetty. With northerly winds there is a high sea on the bar and plenty of sail should be carried in crossing it, as the wind deflected by the cliffs decreases the force of the true wind, and if the broken water is not crossed rapidly heavy seas may be shipped.

There is not much difficulty in quitting the harbor as it can only be attempted in moderate weather, but care must be taken to choose a favorable time of tide; thus, with easterly winds, vessels should leave the jetty before high water, while the east-going stream has still much strength, but with westerly winds they should not leave until the west-going stream is well established.

The coast.—From St. Valery-en-Caux, the coast, a high perpendicular cliff of chalk and flint trends east 15 miles to Dieppe, Point d'Ailly, 5 miles westward of Dieppe, extending northward of that line. The first projecting point, 5 miles eastward of St. Valery, is that of Sotteville, which may be known at a great distance by a heavy looking church tower rising above the trees of the village from which the point takes its name, and by a conspicuous guardhouse. The shelf of rock bordering the shore extends about 400 yards from this point, which should not be approached within 700 yards by vessels hugging the coast with offshore winds.

Raz de St. Michel.—Between Sotteville Point and Point d'Ailly are three wide valleys, separated by high cliffs, occupying half the interval between these points. The middle or St. Aubins Valley descends to the shore, and on its eastern side the waters of the River Dun open a passage through the shingle beach. The rocks which uncover at the foot of the cliffs extend 600 yards from the shore on both sides of this valley, and in front of it an irregular rocky bottom, with from 14 to 20 feet water, projects a mile from the shore. This extension, lying at right angles to the tidal streams, causes the raz or race of St. Michel, a strong eddy dangerous at low water to small vessels sailing near the coast with offshore winds; but the Butte du Catellier kept well open of the point formed by the cliffs near Susette Valley 249° leads outside it.

Point d'Ailly is of a rounded form, and although not so high as many other points of the coast, may be easily recognized, as the perpendicular chalk cliff forms only half its height, a thick bed of clay and vegetable mold, lying above the chalk, sloping down to the edge of the cliff.

Light.—A little within Point d'Ailly stands an octagonal tower 80 feet high, from which is a group-flashing white light, exhibited at an elevation of 324 feet above high water. The light is visible 24 miles.

Fog signal.—A fog siren is sounded from the upper part of gallery of lighthouse.

Semaphore.—There is a semaphore station at Point d'Ailly, about 450 yards westward of the lighthouse.

Roches d'Ailly—Whistle buoy.—The shore eastward and westward of Point d'Ailly, from the Valley of Pourville to that of Quiberville, is bordered by the Roches d'Ailly, a bank consisting of blocks of freestone, which uncover at low water and terminate in a point ½ mile 6° of the lighthouse, outside of which bank the depth is 4 to 5½ fathoms for some little distance. Here is moored a red automatic whistle buoy, from which Point d'Ailly Lighthouse bears 172° nearly 1.6 miles. By night a sector of red light, shown from Dieppe West Pier Lighthouse, covers the whistle buoy and also the whole space between it and the shore.

The Galere, a rock with two heads, one of the Roches d'Ailly, about 600 yards from the shore, but higher and larger than the rest, rises from the middle of the bank, and when its summit is covered there is about 21 or 22 feet water in the entrance to Dieppe. The square church tower of St. Jacques, at Dieppe, seen 2° or 3° open of the cliff on which are the ramparts of the castle, bearing 93°, leads well inside the whistle buoy and close northward of the bank in less than 4 fathoms, but too near the shore for safety.

Grande and Petit Ecamias.—On the meridian of Point d'Ailly, the western part of the Ridens, those heaps of sand and broken shells, before mentioned, are found; they extend 11 miles in the offing and eastward as far as the meridian of Treport. The Ecamias, lying northward of Point d'Ailly, are divided into two groups, and not having less than 7 fathoms water, with from 12 to 15 fathoms round them, they can only be dangerous from the heavy sea on them in bad weather; the Petit Ecamias, the northern group, lies 7 miles, and the Grand Ecamias, the southern group, 4 miles from the shore.

Riden de Dieppe.—The Ridens generally are not dangerous except on account of the high sea in the eddies caused by them during a gale on a weather tide. The Riden de Dieppe, or Frilandais, however, which lies 6° 10 miles from Dieppe entrance, is an exception to this rule, for vessels of deep draft might strike on it at low water, springs; it is about 2.3 miles in length 310° and 130° (including a 5½-fathoms patch at northwest end) the highest part, at its southeast extreme, being ¾ mile in extent, with from 23 to 27 feet water.

As it is probable that these Ridens, being composed of substances easily set in motion, are liable to change their position, the mariner will act prudently when in their vicinity by keeping at a distance from any great eddies, their strength being generally in proportion to the shallowness of the water by which they are occasioned.

The tidal streams follow the direction of the coast between St. Valery-en-Caux and Dieppe, and their rate at springs is about 3½ knots, but near Points Sotteville and d'Ailly they run 4 knots. From observations made in 1878 it would appear that the strength of the tidal streams in the immediate neighborhood of Dieppe is at least 1 knot less than is here given. About the time the rocks off Point d'Ailly begin to cover an eddy stream setting westward commences inshore off Varengeville and continues until the end of the flood. Under the lee of Dieppe Jetties also, about 200 yards eastward of the entrance, a similar eddy is caused; it runs westward close around the east jetty head and joins the stream entering the harbor.

Close inshore the streams turn at high and low water, but a mile or two offshore they run an hour or an hour and a half longer in each direction. The mean duration of the eastern streams is 5h. 40m. and of the western stream 6h. 45m., thus corresponding with the times of the rising and falling tides.

The coast.—About 5 miles eastward of Point d'Ailly is the entrance to Dieppe, the coast between forming a slight bay, near the center of which is the village of Pourville, standing in the most remarkable valley on this part of the coast, it being the only one eastward of Point d'Ailly that descends to the level of the beach; it is watered by the little River Scie, which finds a passage through the shingle to the sea. The hill and cliff separating the valleys of Pourville and Dieppe, together with the chapel of St. Nicholas on the summit of the hill, are good marks for making Dieppe when approaching that port from the northward or northwestward.

Dieppe.—The entrance to this important commercial and fishing port lies 78° 5 miles from Point d'Ailly, and the town, with its suburb, Le Pollet, occupies the entire width of a valley nearly a mile in extent, watered by the Rivers Arques, Bethune, and Aure, which, united, flow into the southeastern corner of the inner port. The Boulevard Maritime runs along the whole sea front of Dieppe, forming a fine promenade and carriage drive. The population of Le Pollet, which is eastward of Dieppe and connected with it by movable bridges, is chiefly engaged in the herring, oyster, and cod fisheries. The principal imports are coal, timber, machinery, and petroleum. The exports are manufactured silks, Paris and Lyons goods, wines, spirits, fruits, vegetables, oil cake, flints, chalk, etc. There are sugar refineries, ropewalks, and shipyards at Dieppe.

The United States is represented by a consular agent. Steamers ply daily between Dieppe and Newhaven, two or three times a week with Grimsby, every 10 days with Cardiff or Swansea, and bimonthly with Christiania. Dieppe, being on one of the main routes between London and Paris, is in excellent and easy communication with all parts of France. The population is about 23,000. There is a good hospital, to which foreign sailors are admitted on payment for medical attendance, and there is a British seamen's reading room supported by voluntary contributions.

The port consists of an entrance channel, outer port or tidal harbor with an area of 21 acres; inner port, also tidal and of about the same dimensions; the tidal harbor, reserved for fishing vessels; and four wet docks or basins, viz: The Duquesne, Berigny, Half-tide, and Floating Basins.

Entrance channel—Depths.—The entrance channel is on the eastern side of the valley, nearly 400 yards from the high cliffs of Femme Grosse Point; it is about 650 yards long, and, commencing in a 142° direction, curves southward and then westward into the outer port, at the southeastern corner of which is the entrance to the inner port. The inner part of the channel is inclosed between the northern quays of the town and Le Pollet suburb. The channel is 82 yards wide throughout between solid piers or jetties of masonry, the west jetty, prolonged by wooden pilework, being about 150 yards longer than the east jetty. The depth at high water springs is 37½ feet, and at neaps 31 feet, the channel having been dredged to a depth of 8 feet in the inner port, and 10 feet in outer port, below the level of the lowest tides, which is about 2 feet lower than ordinary springs. The depth of 10 feet is also maintained in that part of the outer port where the railway quay is situated and where passengers by mail steamers embark and land.

The bottom alongside the quays of the outer port is a mixture of mud and shingle, except where dredged; it is about 3 feet at the north quay and 8 feet at the south quay above the level of low water ordinary springs. Vessels here are exposed to considerable surf when the sea is high at the entrance, which, however, decreases as the water rises in the entrance channel. The inner port has a depth of 6 feet less than the entrance channel and affords good soft grounding berths alongside its quays everywhere.

Harbor works have been commenced for the improvement of this port, involving the construction of a new outer harbor by the further prolongation of the west jetty in a 356° direction, and the construction of a new east jetty extending nearly 600 yards northwesterly from Femme Grosse Point, the entrance being about 100 yards wide between these two jetty heads, and the old east mole being removed. The works are marked by a red flag and lighted.

Basins, etc.—The Duquesne Basin can be entered from the inner port and also from the tidal fishing harbor, by entrances 54 feet wide, with a depth of 24 feet over the sill at high water springs, and 17 feet at neaps. The Berigny Basin opens into the Duquesne, has an area of nearly 9 acres, is 46 feet wide at the entrance, and has 23 feet over the sill at high water springs, and 16 feet at neaps. The Half-tide and Floating Basins, both constructed in the bed of the old Bassin de Chasses, are entered from the inner port. The Half-tide Basin is 492 feet long and 328 feet wide; the entrance gates are 59 feet wide, and have 32 feet over the sill of the northwest gates at high water springs, and 26¼ feet at neaps; the sill of the southeast gates have 3¼ feet less. The Floating Basin or Bassin de la Retenue has a large area, being no less than 1,706 feet long by 289 feet wide, but has no quays on its eastern side. The dimensions of the entrance are the same as of the Duquesne.

The depth of the basins is the same as that of the adjoining lock gates, except the Half-tide Basin, in which there is 1½ feet at the lowest tides.

The harbor and basins therefore admit vessels of any length and of about 23 feet draft at high water springs, and of about 17 feet at neaps.

The basins have very extensive quay frontage, with rails laid, numerous steam cranes, and every appliance for loading and discharging cargo. The Duquesne Basin is opened every tide, day and night, for all vessels, but the Berigny Basin is only opened at night for steamers. Admittance to the others is generally available at springs from 2 hours before until 2 hours after high water.

Dry dock.—The Government dry dock, on the northern side of the inner port, is 361 feet in length over all and 319 feet on the blocks, 67½ feet wide at entrance, and has a depth of 30 feet on sills, or 26¾ feet on the blocks at high water ordinary springs.

There is a gridiron in the outer port 198½ feet long and 37¾ feet wide; also a heaving-down pontoon in the Berigny Basin.

Coal can always be obtained in any quantity and at a moderate price; about 15,000 tons are usually in stock. Vessels are coaled either alongside the wharves in the tidal harbor or in the new floating basin, where there is a depth of about 22 feet.

Pilots.—Twelve pilots and three assistants are stationed at Dieppe and cruise in the offing in decked cutter rigged boats; when prevented by bad weather from boarding vessels, they direct them from the jetties. Pilots are always on watch at the end of the jetties, day and night.

Tugs are always available.

Lights—West jetty.—From a white iron tower 42 feet in height, at the head of the West Mole, and at an elevation of 52 feet above high water, an occulting light with a red sector is exhibited, the white light being visible 8 miles, red light 6 miles.

The west jetty extension works are marked by four vertical white lights, which are moved outward as the works progress.

Fog signal.—A bell is sounded in thick or foggy weather on the west jetty. One stroke sounded in the intervals of continuous ringing indicates a depth of 13 feet in the entrance channel, two strokes 16¼ feet, and so on.

East jetty.—From an iron turret 28 feet in height, on the head of east jetty, a fixed red light is exhibited at an elevation of 37 feet above high water, visible 3 miles.

Three white lights mark the end of the old east jetty, which is in course of demolition.

Two lights, fixed red, vertical, are exhibited on jetty south of east molehead.

Special signals for steamers.—When one or more steamers are about to enter or quit the port, signals are hoisted either by day or night on a small mast about 20 yards within the house of the keeper, on the west jetty; these signals are repeated on the summit of la Femme-Grosse Point, near the semaphore, and also at the mast near the entrance of the Half-tide Basin. While these signals are displayed, access to the entrance channel is forbidden to all other vessels; those already within it, however, are to continue their movements.

A white flag with a blue border hoisted above a red flag indicates that a steamer may enter but not leave the port. The white flag with blue border under a red flag indicates that a steamer may leave but not enter. At night, red and white lights are substituted for the flags.

Semaphore.—There is a semaphore station on the cliff of la Femme-Grosse, 530 yards from the entrance to Dieppe.

Tides.—It is high water, full and change, at Dieppe at 11h. 8m.; springs rise 29½ feet, neaps 23 feet above the level of the soundings, which is about 2 feet below the level of low water ordinary springs. At spring tides, high-water slack lasts 10 minutes; at neaps, 30 or 40 minutes. Fresh westerly winds cause the tide to rise a foot or 18 inches higher than in calm weather, and easterly winds have a contrary effect. The highest tide takes place about 52 hours after full and change, and the least tide occurs about 63 hours after the quadrature. The mean duration of the rising tide on the beach at Dieppe is 5h. 40m. and of the falling tide 6h. 45m.

A lifeboat is stationed at Dieppe, and there is a mortar apparatus and other appliances on each pier.

Dieppe approach—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the port of Dieppe are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

The fairway is limited as follows: On the east, by the alignment of the landslip north of Le Pollet and East Jetty Lighthouse; on the west, by the alignment of the signal mast near the semaphore and West Jetty Lighthouse; on the north, by the arc of a circle drawn, with West Jetty Lighthouse as center, with a radius of 2 miles. The above limits have not been placed on the chart plates.

Directions.—The best time to enter is at high water. Large vessels should only enter from one hour before high water. The entrance to the harbor is difficult of access from one hour to three hours after high water, on account of the tidal stream which sets from the northward directly on to the west jetty; its strength at spring tides is nearly 2 knots.

In strong southwesterly gales great care is necessary on the last of the flood and first of the ebb, as a strong current runs through the piles of the west pier, taking the vessel first on the bow and then on the stern.

Vessels of deep draft arriving off Dieppe during neaps are entitled to a pilot to take charge of them at sea until there is sufficient depth to enter. When standing for the land with westerly winds toward the hour of low water, a position to windward should be maintained by making short tacks between Point d'Ailly and St. Nicholas Chapel until there is water to run for the entrance; with easterly winds, a vessel should keep on the meridian of the chapel a few hours in a depth of 3½ fathoms, about ½ mile from the shore, 345° or 323° of St. Nicholas Chapel. This anchorage is called Dieppe Road, but with any appearance of northerly winds it should be left with all speed and a good offing gained.

In standing for the harbor, until half an hour after high water, the west jetty head should be steered for, whatever the direction of the wind, because at 100 yards outside the jetty heads the eastern stream continues to be felt 40 minutes after high water, and it runs at the rate of 1½ knots. With a light wind, if this precaution is not taken, the vessel will be drifted eastward of the entrance. The west jetty head should be approached with caution, and if no pilot is on board sufficient sail should be carried to execute quickly any change of course the pilots on the jetty may direct.

Moderate winds from northwest by north around by north to northeast by east are the most favorable for entering Dieppe; with all other winds it is necessary for a vessel either to secure the services of a tug or to steer for the weather jetty to be tracked in. The Valley of Dieppe has a great influence on the direction of offshore winds; thus, if the wind is east by south in the offing it will be southeast by south at the entrance of the harbor, and if west outside it will be southwest by south in the harbor and entrance channel. Southwest by west winds are deflected by the high cliff between Le Pollet suburb and Femme-Grosse Point, and their force much weakened; a vessel, therefore, running for the harbor with the wind between southwest by west and west by north should carry good sail to cross the broken water caused by these winds at the entrance.

Telegraph cable.—A telegraph cable connecting with Beachy Head leaves the shore a short distance eastward of Dieppe.

Beacons.—Two beacons painted with white and blue horizontal bands and surmounted by white round top marks, mark the landing place of the telegraph cable at La Puys; the front beacon is situated on the beach near the telegraph house, and the rear beacon a distance of 120 yards 146° from the front beacon.

The coast from Dieppe trends 55°, 13.5 miles to Treport, and like that westward of Dieppe, consists of high perpendicular cliffs of chalk and flint, intersected by numerous valleys. The land adjacent to the cliffs is slightly undulating, the highest parts being in the vicinity of Penly village and on the western point of the entrance of Criel Valley, where the cliff is surmounted by Mont Joli-Bois, a remarkable conical mound covered with heath, of which the base is ½ mile wide.

The valleys, which may be recognized from the offing, are those of Puits, Belleville, Berneval, Penly, Neuvillette, Criel, and Mesnil. Puits Valley descends to the shore a mile eastward of Dieppe, and at the top of its eastern steep edge are the remains of the Camp de Cesar, an ancient Roman encampment. The Valleys of Berneval and Penly, the third and fourth eastward of Dieppe, are separated by 700 yards of perpendicular high land, and communicate with the beach by ravines hollowed out by floods caused by heavy rains. Criel Valley, at the foot of Mont Joli-Bois, is ½ mile wide at its entrance and is watered by the little River Yeres, which forces a passage for itself through the beach. When off the entrance of the valley, with it bearing 176° or 187°, the little town and spire of Criel will be seen up the valley about a mile from the shore. The Valley of Mesnil is 2 miles westward of Treport, and is the last valley before reaching that place; it descends almost to the level of the beach.

The whole of this coast is bordered by a rocky ledge, which dries at low water, and a large quantity of shingle is heaped up at the foot of the cliffs. Throughout the greater part of its extent the ledge is not more than 200 yards wide, but in three places it projects farther and is dangerous to small vessels hugging the coast with offshore winds. From abreast of Belleville Valley to the rocks at the foot of Mers Cliff, eastward of Treport, a beach of muddy sand and gravel dries at low water in front of the ledge bordering the shore.

Roches du Heaume.—The western projection of this ledge extends ½ mile from the shore in front of Berneval and Penly Valleys; the rocks are uneven, and the Roches du Heaume, the highest heads, uncover from 2 to 4 feet near its outer edge.

Roches du Muron.—The second projection of the ledge fronts the Valley of Mesnil; it extends 800 yards from the shore, and on it are the Roches du Muron, a rocky group which uncovers 18 feet and bears 300° 600 yards from the guardhouse at Mesnil.

The Haumes and Granges rocks, the easternmost projection of the ledge, lie from 800 to 1,600 yards westward of the entrance to Treport and 700 yards from the cliffs; they consist of small ridges of rock rising above the sands. The Haumes, the western ridge, has several heads, of which the highest uncovers 8 feet. The Granges, the eastern ridge, is nearly 800 yards from the west jetty of Treport, and its highest part at the southeastern point of the ridge uncovers 6 feet; its northern part, 269° 600 yards from the jetty head, uncovers only a foot. Between the Granges and the Haumes there are two isolated rocks, which uncover, respectively, 1 foot and 7 feet.

Between the meridians of Dieppe and Treport, the bottom is uneven and the depths irregular as far as 4 or 5 miles from the shore. The principal inequalities met with are the heaps of sand and broken shells named the Ridens de Belleville, de Neuvillette, de Treport, and the Banc Franc-Marque. At 8 miles from the shore is the Riden de Dieppe, already described.

Ridens de Belleville, about 3 miles from the shore in a 325° direction from Berneval Valley, are narrow ridges running parallel with each other in a 325° and 145° direction, the least water on them being about 25 feet. The tidal streams occasion strong eddies among these ridges and vessels subject themselves to a heavy sea by crossing them in bad weather during a weather tide.

Ridens de Neuvillette are small narrow sand bands, on which the depths are from 3¾ to 5 fathoms. They commence about 1,400 yards from the shore abreast of Neuvillette Valley and extend nearly 2 miles into the offing. The eddies on them are in general less dangerous than those on the Ridens de Belleville.

Ridens de Treport are four narrow ridges running parallel with each other in a 325° and 145° direction, at from 2.3 to 3.5 miles from the shore, and 1.5 miles in extent from east to west. The western ridge, 300° 3.8 miles from the entrance of Treport, has only 21 feet water; the others have from 19 to 25 feet on their highest parts.

Banc Franc-Marque, from its southwestern extreme north 1.8 miles from the entrance of Treport, is 1.5 miles long 35° and 215°, and 1,400 yards wide, with depths of from 2¼ to 3 fathoms. It appears to be the outer part of the bank, equally shoal, which extends from the shore, and trending 232°, is only separated from it by a channel not more than 2 or 3 feet deeper than the shoal. It is also connected with the eastern Treport riden by a narrow ridge having depths under 5 fathoms.

Anchorage.—The holding ground is in general good along the coast between Dieppe and Treport, and vessels may anchor with offshore winds during an adverse tide, but in such a position that they can gain an offing should the wind change and blow on the land. From Mont Joli-Bois to Treport there are many patches where the bottom consists of a black substance which appears to be peat, and here the anchors penetrate so deeply that they are difficult to weigh. There is anchorage to await tide, with offshore winds and fine weather, 2 miles westward of Treport and 1.5 miles from the shore abreast of Mesnil Valley, in a depth of 6 to 7 fathoms, sand and broken shells. The mariners of Treport call this the Petite Rade; the Grande Rade is ½ mile farther out and has excellent holding ground with muddy bottom. At either anchorage a vessel should weigh and quit the coast at the first appearance of bad weather. A bottom, on which the soundings are less than 5 fathoms, extends a mile from the shore in front of Criel Valley, and again at Treport, from whence its outer edge runs nearly parallel with the shore as far as the meridian of Mers and then turns back westward round the Banc Franc-Marque, leaving a small deep with excellent holding ground in 4¼ fathoms, between that bank and the shore.

Treport is a commercial and fishing port with a population of about 4,949, situated at the entrance of the Bresle Valley, the easternmost but one of all those valleys which break the uniform outline of the cliffs between Cape d'Antifer and the River Somme. The entrance to the valley is ½ mile wide, between abrupt hills rising 295 feet above the sea, and at the foot of the cliff in the southern part of the valley stands the town of Treport, its houses overlooked by a terrace and a large church built half way up the hill. The village of Mers stands on the slope of the hills on the northern side of the valley; and, 2 miles southeastward of the entrance, on a plain surrounded by hills covered with wood, is the Chateau d'Eu and the town of that name, containing a population of about 4,861 inhabitants.

The railway station is on the northern side of the port close to the sea; by it, Treport is connected with the northern network of railways by lines running east, west, and south. The principal imports are coal, jute, and grain; the exports, the products from the Bresle Valley and goods from mid-France, and even from Switzerland. Glassware is the chief manufacture of the district. This trade is maintained chiefly by a service of small steamers going or returning twice a week to and from London, and also a service between Treport and the following ports: Bristol, Swansea, Manchester, Barrow-in-Furness, Dublin, Belfast, Leith, Dundee, and Southampton.

There is a large fishing trade at Treport. The harbor offers a useful refuge to small craft driven inshore by stress of weather. It consists of a tidal harbor, an inner port, a basin or wet dock, and an immense reservoir of scouring water immediately behind the tidal harbor with a surface of about 41 acres, communicating with the River Bresle by means of the Penthievre Canal.

Depths.—The flat fronting the harbor extends 300 yards beyond the piers and uncovers 3 feet; the bottom of the entrance channel is from 3 to 6½ feet above the level of the lowest tides; consequently, the least depth in the entrance at high-water springs is about 25½ feet and at neaps 19 feet. The tidal harbors and basin have less water, but, at springs, vessels of 18 feet draft can enter the port and basin; and at neaps, those of from 10 to 12 feet draft.

The entrance channel is between two jetties of masonry a portion of which being supported on arches allows part of the swell to pass through instead of the jetty receiving the whole force of it. The east jetty is 300 yards long, the west jetty about 20 yards less, though it projects considerably beyond the east jetty; they are not quite parallel with each other, and, therefore, while the width of the channel is 60 yards at the entrance it is 85 yards wide at their inner end.

The tidal harbor is 280 yards long, 220 yards wide, and has about 550 yards of quayage. The free stone bottom is visible almost throughout its whole extent, but at the foot of the quays it is covered with mud and shingle sufficiently soft to ground on, the berths being about 10½ feet above the zero of soundings, and having over them from 21½ feet water at springs to 15 feet at neaps. The best berths are in the northern angle of the harbor close to the railway, where the little London steamers lie and unload. In all other parts, with onshore winds, there is much surf, and vessels strike heavily before they ground.

The inner port is entered at the northeastern corner of the tidal harbor, and is the connecting link between that harbor and the basin, and is also tidal. It and the basin were formed in the bed of the

River Bresle, and it communicates by double gates with the basin at its eastern end.

The basin, for a length of 333 yards, is 100 yards wide; here vessels can make fast alongside the quays in 13 feet water. This depth is now being increased by dredging, the intention being that there shall be a least depth in the basin of 19½ feet at high water springs and of 11½ feet at neaps. The basin is entered from the inner port by a lock 130 feet long, 52 feet wide, and with 19 feet over the sill at high water springs and 10½ feet at neaps. The southeastern end of the basin opens into the Canal d'Eu with gates of similar dimensions.

The Canal d'Eu is 1.5 miles in length and has from 12 to 13 feet water; it terminates in a small basin in the northwestern part of the town of Eu. The surplus water of the Bresle—i. e., all which does not pass through the Penthievre Canal into the reservoir—flows into the basin at Treport, and thence into the sea through a small sluice near the lock entrance.

Pilots.—Two pilots and two assistant pilots are stationed at Treport; they also conduct vessels by the canal to Eu. Their services can always be obtained in moderate weather, and no stranger should attempt this harbor without a pilot.

Lights—West jetty.—A white masonry tower, 39 feet in height, stands 75 feet from the west jetty head at Treport; from it, at an elevation of 48 feet above high water, a group-flashing light is exhibited. The color of the flashes is white when the height of the tide is 22⅓ feet or more above the zero of soundings on the chart and green when the water level is less than that height. The white light is visible 11 miles, green light 9 miles.

East jetty.—A fixed red light, visible 4 miles, is shown at an elevation of 25 feet above high water from an iron pole near the outer end of the east jetty.

Fog signal.—In thick or foggy weather a bell is sounded on the west jetty from three hours before to three hours after high water.

Tides.—It is high water, full and change, at Treport at 11h. 12m.; springs rise 32 feet, neaps 25½ feet above the zero of soundings, which is 3½ feet below the level of low water ordinary springs. Slack water lasts 10 or 15 minutes at springs, but with northeasterly winds its duration is half an hour.

Special signals.—The following special signals relative to entrance and departure of vessels from the port are also made:

a. Ships wishing to enter the harbor by day must request permission by hoisting a flag or at night by exhibiting a white light at the mainmast.

b. If towing another vessel, ships wishing to enter by day must request permission by hoisting a flag at the mizzen, and at night a white light must be exhibited at the mizzenmast in addition to the towing lights.

Signals made from the mast on the East Jetty signify:

Day.	Night.	Signification.
1. Red flag	Green light	Entrance to harbor is prohibited.
2. White flag with blue border	Red light (near lock of basin)	Floating basin is accessible.
3. Red flag, under white flag with blue border.	Green light under white light.	Steamer, or a sailing ship in tow, is about to enter the harbor.
4. Red flag, over white flag with blue border.	Green light over white light.	Steamer, or a sailing ship in tow, is about to leave the harbor.

The East Jetty signal staff works on a pivot and has two black arms. When the pilots are unable to board vessels in the offing, they incline it to the right or left, according as the vessel should keep to starboard or to port. When the movable part is kept horizontal, the entrance is inaccessible.

Coal.—There is no regular supply of coal for ships, but about 2,000 tons are imported annually, and 150 to 200 tons may probably be in stock.

Directions.—If a vessel's draft admits of her entering Treport she has nothing to fear in ordinary weather from the banks and Ridens in its vicinity, but for the reasons already given they should be avoided when there is much wind. Sailing vessels running for the harbor from the westward or northward, with westerly winds, much before high water, should make the land about Criel Valley, under Mont Joli-Bois, so that a position may be retained to windward of the harbor until there is sufficient depth to enter. At night the lights of Ailly, Ault, and Cayeux are excellent guides for Treport.

With a strong southwest by south wind to avoid passing too close to the Haumes and Granges Rocks, on which the sea breaks even at high water, the East Pierhead should be brought a little open of the West Pierhead before hauling in for the latter. Vessels of the deepest draft that the port admits should enter between half an hour before and half an hour after high water, springs; and, as the flood or northeastern stream runs across the entrance at the rate of from 1½ to 2 knots at 600 or 800 yards outside the jetties, and continues to be left with less velocity until 1½ hours after high water, sailing vessels must avoid being drifted to leeward of the entrance, which, however, is rarely missed in moderate weather.

In running for the harbor with a strong wind from the offing, and a high sea, when pilots can not go out to meet vessels, the anchors should be clear for letting go, hawsers coiled on deck, an anchor ready to moor by the stern, and sufficient sail carried to perform any necessary maneuver. These arrangements being completed, and no signal being made that the bar is not practicable, steer to pass close to the

West Jetty head and watch for indications of alterations in the course being made at the flagstaff on the east jetty, or, as it is approached, by the pilots on the west jetty, who indicate by signs the courses to be steered in entering the channel.

With a strong westerly wind, should a vessel be driven to leeward of the entrance and be unable to regain an offing, she should anchor and wait until the ebb stream commences, if the state of the weather permits, and then weigh and gain an offing; but if the sea is too high near the shore, where, indeed, the holding ground is not good, she should anchor in the small deep under the lee of the Banc Franc-Marque, where she will be in some degree sheltered, and with two anchors down and a long scope of chain she might ride out the flood and gain an offing on the ebb. If the wind is too far northward to reach this deep or to claw off the coast, the only resource is to run ashore on the shingle beach with all sail set, as near as possible to the East Jetty; the shingle yields readily under a vessel, and if she takes the ground near the top of high water the crew will be saved.

With offshore winds the harbor should be entered before high water. With a moderate wind and smooth sea, a vessel may easily get close in to the West Jetty head, and a crew is always at hand on one or the other jetty according to the direction of the wind, to track in. With strong offshore winds, violent squalls come down from the cliffs and out of the valleys, and it often happens that when standing for the jetty on the starboard tack, a vessel is taken aback in the midst of the rollers on the bar.

When leaving the harbor bound northward in order to avoid the banks which uncover at the mouth of the Somme River and which extend as far out as the bearing 19° from the entrance to Treport, do not go eastward of the line of the eastern extreme of the wood surrounding Grange Farm, above Treport, 3° open westward of the summit of the cliff at Mers Point bearing about 194°; bearing in mind that the flood stream runs eastward for at least 1½ hours after high water in the harbor and for still longer in proportion as the distance from the shore is increased.

The coast.—The white cliffs bordering the coast from Cape de la Heve terminate at the eastern part of the town of Ault, which lies 53° about 4 miles from Treport and occupies the entrance and the northeastern slope of a deep narrow valley at the head of the bight between Capes d'Antifer and Gris Nez. Nine valleys break the uniformity of the coast between Treport and Ault, and the shore is bordered by a rocky shelf which in some places uncovers 500 yards from the cliffs at low water, the sea leaving a narrow space of hard sand in front of the shelf.

The hills trend away from the shore in a 65° direction from Ault to the left bank of the River Somme and the coast line becomes low, the hills joining by easy slopes the alluvial plain which lies between them and the sea. This level plain, consisting of meadows and cultivated land, is defended from the sea by a natural high shingle beach, 400 yards wide, sloping down to hard sands which uncover ½ mile out.

The coast between Treport and Cayeux is inaccessible with onshore winds, and a heavy sea runs in on it during westerly gales. The beach between Ault and the first guardhouse northward of it is exposed to all the violence of winds between southwest by west and northwest by west, and the high sea occasioned by these winds drives the shingle collected at the foot of the cliffs between Treport and Ault rapidly toward and beyond the guardhouse. After westerly gales it frequently happens that little or no shingle remains on this part of the beach, and but for a small artificial dike constructed here the sea would undoubtedly make an inroad on the plain.

Ault Light.—From a round white lighthouse, 76 feet high, on the hill northeastward of the town of Ault, and at an elevation of 331 feet above high water, is exhibited a group occulting light, with a red sector, covering the banks at the entrance of the River Somme; white light visible 12 miles; red light 10 miles.

Cayeux.—The low coast which commences at Ault trends nearly in a straight line 5 miles northeastward to the town of Cayeux, which is a mile in extent, stands on the shore in the midst of sand hills, and is in railway communication with St. Valery and thus with the general system of the country. The town is partly inhabited by fishermen, who, as the coast affords no shelter, haul their boats up above high-water mark in summer and in winter place them in the little harbor of Hourdel, within the mouth of the Somme.

The only remarkable objects on this part of the coast are the houses of Cayeux, its church, particularly the bell tower, and five windmills in and around the town. In westerly gales the sea heaps up a great quantity of sand in front of the northern part of the town, which is carried away by high winds into the interior.

Within a mile southward of Cayeux Church is a sheet of water named the Hable d'Ault, where the fresh water of the plain collects. Until the year 1767 this Hable (a corruption of the word havre or haven) communicated with the sea by a channel into which the fishing boats of Ault and Cayeux, as well as small coasters, could run for shelter, but successive invasions of shingle filled up the entrance.

Vessels of deep draft should not approach the coast between Mont Joli-Bois and Cayeux, nor should small vessels, unless bound to Treport or the River Somme. The depth is only 4½ or 5 fathoms at 3 miles from the shore between Treport and Cayeux; outside this the soundings generally increase slowly to 8 and 9 fathoms at 6 or 7 miles in the offing, but, as before explained, vessels must be on their guard against small banks or Ridens with less than 5 fathoms on them.

The sand banks which uncover at the mouth of the Somme extend southwestward beyond Cayeux; with Cayeux Church bearing 109° they dry out more than a mile from the shore at springs.

Cayeux Lights—Northeast Light.—A round white tower, 89 feet high, stands near the shore 1 mile northeastward of Cayeux; from it is exhibited, at an elevation of 92 feet above high-water, a flashing red light, visible 11 miles.

Landmark.—At ½ mile westward of Cayeux Church and 1.8 miles southwestward of the Northeast Light there is a round white masonry tower 41 feet high near the shore, which serves a good landmark.

Semaphore.—There is a semaphore station about 100 yards southwestward of Cayeux northeast lighthouse.

Lifeboat.—A lifeboat is stationed at Cayeux

Estuary of the Somme—Depths.—This estuary lies between the town of Cayeux and St. Quentin Point, which bear 6.3 miles from each other. It is bounded on the south by the plain of which Cayeux occupies the northwestern angle, and on the north and northeast by the lowlands of Marquenterre and the Favieres marshes. The little harbors of Hourdel, St. Valery-sur-Somme, and Cortoy, are within the estuary; the two first on the southern, the last on the northern bank. Vessels of from 15 to 18 feet draft can get up to Hourdel Harbor at springs, and of 8 feet draft at neaps. The Crotoy Channel, when not obstructed by sand banks, as it sometimes is, admits vessels of 12 or 13 feet draft at ordinary springs. The channel leading up to St. Valery has been so improved that vessels drawing from 13 to 15 feet can get up to that town, which is the outport to Abbeville, with which it communicates by a canal 7.3 miles long.

Left bank of the Somme.—From Cayeux the left bank of the river takes a northeasterly direction for 3.5 miles to Hourdel Point, and is skirted by an immense quantity of shingle of an average breadth of 600 yards, which, as far as 2 miles from Cayeux, is covered by sand hills of moderate height; but from Cayeux northeast lighthouse to the low point of Hourdel the shingle is uncovered and lies in a series of undulations, parallel with each other and with the shore.

Between Hourdel Point and St. Valery-sur-Somme the shore is low, and at high water, springs, forms a bay 2.3 miles long and ½ mile deep, the land being defended from the incursion of the sea by an embankment, in front of which is a wide beach, parts of which hardly cover even at springs. The town of St. Valery, with its suburb La Ferte, occupies a space of 1.5 miles along the shore, and is built on the northern slope of a group of hills forming the northern point of the highland between the rivers Somme and Bresle;

the northwestern hill, 128 feet high, the most conspicuous from the offing, has on its summit a clump of tall trees and a windmill.

The harbor of St. Valery is at the eastern part of the town, and the navigation of the Somme ends here; for, since the waters of this river and of the streams flowing into it above Abbeville have been diverted into and run out by the canal, the old bed of the river has nearly silted up.

Right bank of the Somme.—The northern shore of this estuary trends in a 323° and 143° direction; the most conspicuous object on it is the little town of Crotoy, built on a projecting point 2.3 miles 92° from Hourdel Point and 1.5 miles 8° from St. Valery; the ruins of its fortifications, four windmills showing above the ruins, the church tower, and the roofs of some of the houses serve to mark its position from a distance.

The coast for 4 miles southeastward of Crotoy is low, and an embankment follows all its sinuosities, protecting the adjacent land from the sea. The southern part of St. Quentin Point, as seen from Crotoy, is about 4 miles 315° from that town, and in the intervening space the coast, consisting of low sand dunes, recedes a mile and forms a bay, at the head of which the little River Maye, which receives a large portion of the waters of the Marquenterre, loses itself running through the beach. The only objects that attract attention on this low coast are the windmill at St. Pierre, ¾ mile northward of Crotoy, and St. Firmin Church tower, 0° 2.8 miles from Crotoy.

St. Quentin Point is rounded, and is a slight projection 1.5 miles northward of the point visible from Crotoy, from which latter the coast undergoes a sudden change in direction. The only object which serves to mark St. Quentin Point from seaward is a guardhouse built among the sand hills on the point. These sand hills are higher than those on the coast to the southeast by south, and may be seen in clear weather 8 or 10 miles distant.

Banks in the estuary of the Somme.—The whole space included between the shores of the estuary just described is nearly filled with a mass of sand which uncovers and extends 1.5 miles seaward of a line drawn from Cayeux to St. Quentin Point. The surface of this sand is subject to great changes from the effect of wind and tide, it being every day furrowed afresh by the tidal streams and heaped into banks of which the shape and height are extremely variable. From the parallel of Cayeux to that of St. Quentin Point the banks as a whole slope gradually seaward but are steep toward the land; their high parts extend from northwest by west of Cayeux Lighthouse to north of Hourdel Point and are not covered at the lowest neaps; the highest part of all in the northern part of the bay, called l'Ilet by the fishermen, is 29 feet above the zero of soundings, and only covers at high spring tides.

Entrance channels.—None but fishing boats or small coasters, piloted by local seamen, can enter the Somme by the narrow winding channel under St. Quentin Point. The two principal entrances are through the southern part of the banks; the entrance to the South Pass (now closed) being abreast of Cayeux, and that of the Northwest Pass (the principal entrance), northwestward of the northeast lighthouse. These passes are subject to such incessant changes from the shifting of the sands that a detailed description of them is impossible. They always, however, show a disposition to regain very nearly the positions assigned them on the chart. They are separated from each other by a bank, which uncovers from 11 to 21 feet at the lowest tides. The two channels meet and form one channel, sometimes above and sometimes below Hourdel, but again separate, one portion taking the direction of Crotoy, the other of St. Valery. Though their outer parts are nearly dry at low water, they do not dry throughout, but as far eastward as the meridian of St. Quentin Point, have a succession of depressions, some with as much as 18 feet water, these depressions being separated from each other by shallow bars. Eastward of the meridian named the bottoms of the channels are everywhere above the level of low water, but they do not dry entirely, though in no part is there sufficient water for even the smallest coasters to lie afloat.

When, as is usual, the two narrow channels just described unite and form one channel between Cayeux northeast lighthouse and Hourdel Point, it is from thence called the Somme Channel, is generally about 400 yards wide, and follows the direction of the shore; but when the junction takes place eastward of Hourdel Point, as it did in 1878, the South Pass is the only one by which Hourdel can be directly reached.

Buoys.—The following buoys mark the approaches to the Somme:

A red and black automatic whistle buoy is moored in a depth of about 5 fathoms, with Cayeux southwest lighthouse bearing 105° 3.3 miles.

Two bell buoys lie at the edge of the sands in from 13 to 16 feet of water; they are about 3 miles apart. The southern buoy, painted with black and red bands and surmounted by a spherical topmark, is situated at a distance of 1.4 miles, 280°, from Cayeux old southwest lighthouse. The northern buoy, painted black, and surmounted by a cylindrical topmark, is situated at a distance of 3.4 miles, 350°, from Cayeux old southwest lighthouse.

The Northwest Passage, which is now the principal channel, is indicated by two spherical buoys; No. 1, painted black, and surmounted by a cylindrical topmark; and No. 2, painted red, and surmounted by a conical topmark.

There are also five conical buoys marking the channel; three painted black and numbered 3, 5, 7; two painted red and numbered 4, 6.

The West Passage, a secondary channel, is indicated by a black spherical buoy surmounted by a cylindrical topmark, and marked A1; it is situated at a distance of 1,800 yards 329° from Cayeux lighthouse. There are also five conical buoys, three painted red and numbered A2, A4, and A6, and two painted black, numbered A3, A5.

A conical, red and black buoy, marked A, is moored at the junction of the northwest and west passage; this latter has shifted to the southwestward.

Saint-Valery Channel has seven black buoys, distinguished by the odd numbers 9 to 21, and six red buoys, with the even numbers 8 to 18.

Crotoy Channel has four black buoys, numbered C9, C11, C13, C15, and four red buoys marked C10, C12, C14, C16.

A conical black and white buoy, lettered C, marks the bifurcation of the Saint-Valery and Crotoy Channels.

A green wreck buoy, indicating the position of an old wreck, and marked "Bancas de Somme," is moored 316°, 1,200 yards from Cayeux light.

The inner parts of all these passages and of the Crotoy and St. Valery Fairways are marked by red and black buoys and perches in accordance with the French system, which are shifted as the channels change, the greatest care being taken to keep them in proper positions.

Tides.—The tides at the entrance of the Somme are the highest met with anywhere between Cherbourg and Dunkerque, equinoctial springs rising 35 feet above the level of the zero of soundings, and in each direction from the Somme their height diminishes. It is high water, full and change, at Cayeux, at 11h. 14m.; ordinary springs rise 28½ feet, neaps 22 feet above the zero of soundings. At Hourdel, where the bottom is 11 feet above the zero, ordinary springs rise from 20 to 21 feet, and neaps about 10 feet. At St. Valery it is high water, full and change, at 11h. 48m., and the tide rises at springs 32 feet above the zero of soundings, and at neaps about 25½ feet; the bottom of the harbor is from 14 to 16 feet above the zero. At Crotoy the tide rises about 15 feet in the harbor at springs and only 4 feet at neaps, with about a foot more in the entrance. In all these harbors strong westerly winds raise the tides a foot or two and easterly winds have a contrary effect.

Tidal streams.—At 3 hours flood, the stream in the Somme Channel runs 6 or 7 knots at springs, but when the channel widens the stream in some degree loses strength. The greater part of the banks of shifting sand, near Hourdel Point, do not cover until 2¼ hours flood. From this cause and until this time the rapid stream through the Somme Channel continues to run northeastward between these banks and the eastern edge of the high bank barring the mouth of the Somme, and does not run eastward until joined by the stream which enters from the northwest, and by that flowing in along the edge of the beach on the northern shore of the estuary, by which time the banks are generally covered. The stream then follows the course of this northern beach until abreast of Crotoy, when the banks turn it southeastward toward St. Valery.

When the banks around Hourdel Point are covered the flood finds a passage along the southern shore of the estuary and its speed slackens considerably. The channel formed by the tide along this shore is sinuous, uneven, extremely variable, and, as a rule, not so deep as that leading to Crotoy, from which it is separated by shifting sands.

Offing tidal streams.—At the distance of 4 to 5 miles from the shore westward of St. Quentin and Haut-Banc Points, the flood tide commences about 2h. 10m. before high water at Dieppe (or Dover), and its general direction is 8°. The ebb stream commences about 3h. 20m. after high water at Dieppe, and runs in a southwesterly direction.

Pilots are both necessary and compulsory for vessels over 10 tons; they are stationed at Cayeux, Crotoy, and St. Valery, and in moderate weather cruise at sea. Those of Cayeux do not take vessels beyond Hourdel unless no pilot for St. Valery or Crotoy presents himself. Those of Crotoy only are allowed to take vessels to any port in the Somme.

Two tugs are stationed in the Somme, and when not engaged are usually on the lookout for vessels outside the entrance channels.

Directions.—No sailing vessels off the mouth of the Somme should stand into a less depth than 6½ fathoms, unless bound into the river, in which case, with westerly winds, and before there is sufficient water to pass through either of the outer channels, they should maintain a position on the meridian of Mers Cliff and southwestward of Cayeux Church tower; or, if the weather permits, they may anchor in about that depth, good holding ground, on the meridian of the cliff and 267° of Cayeux; with offshore winds they may anchor a little westward of the large bell buoys moored outside the banks, and no vessel should attempt to enter without a pilot. The tidal signals make known when the narrows are practicable, and then, with a fair wind, a vessel may enter under sail, or, with a foul wind, secure the aid of a tug.

In bad weather pilots can not always board vessels requiring them, and such vessels may be embayed and compelled to run in, which is always practicable toward high-water, springs, when the signals and buoys marking the channels can be seen. To meet such an emergency a flagstaff with the upper part working on a pivot stands ½ mile northeastward of Cayeux Northeast Lighthouse; on this a flag is hoisted and is inclined to the right or left as may be necessary to direct a vessel in the channels; if she has entered and is steering a proper course the flagstaff is kept in a vertical position; if not it is drooped on the side toward which she should steer. These signals are made to vessels of all sizes when they have signaled for a pilot.

Vessels that have entered and find themselves unable to reach either of the ports should run aground under cover of one of the points or under the lee of a bank, where they will be sheltered from the stream, for those grounding on the soft, shifting sands in the strength of the stream are liable to be undermined by it and capsized.

At night pilots will not risk bringing vessels in, except it be moonlight or very clear and fine.

Hourdel.—When the Hable d'Ault was closed the bight within Hourdel Point served as a refuge for the Cayeux fishing boats, but the constant increase of the sands threatening to fill it up, an artificial tidal harbor open to the eastward was made to shelter coasting craft. It is from 270 to 325 yards long and 76 yards wide and has a reservoir for clearing the entrance by sluicing. It will contain about 30 vessels well secured, but, except for the Cayeux fishery, its trade is entirely unimportant. As the direction of the entrance is athwart the tidal streams, which are very strong except just at high water, it is imprudent to attempt to enter without a pilot, who, if unable to board a vessel in the offing, can at all times do so after she has passed through the outer channels.

Harbor light.—A fixed white light, visible 6 miles, is exhibited from a yellow wooden gibbet on Hourdel Point at an elevation of 36 feet above high water. It is shown from three hours before to three hours after high water.

Fog signal.—In foggy weather a bell is sounded at Hourdel Point from one hour before to three hours after high water.

St. Valery-sur-Somme is 3.5 miles above Hourdel Point, from which its entrance bears 120°. Its tidal harbor is, properly speaking, the continuation of the Somme Canal outside the lock. An earthen embankment, 1,100 yards long, which begins at the lock and terminates in an open stockade 70 yards long, shelters it from north to east, and a low dike parallel with the shore preserves the channel between it and the shore as far as the lighthouse. On the west and south it is bounded by the shore of La Ferte suburb, a part of which, 438 yards long, has been converted into a quay, and along the shore as far as the lighthouse there is a towing path, which, with the intention of reclaiming the land to the southward, was continued as a low dike across the sands as far as Hourdel Harbor, but has sunk beneath them. The population of St. Valery is about 4,000. It is the only commercial port of the Somme, and by means of the Somme Canal is connected with Abbeville and with the general canal system of France and by the branch railway to Noyelles with the general railway system.

Trade—Depths, etc.—The exports are chalk, vegetables, sand, and ballast; the imports, wood, coal, pig iron, etc. The harbor is quite sheltered from wind and sea, and can berth from 30 to 35 vessels alongside the quays, where they ground on a bottom of chalky mud mixed with sand and some shingle; at ordinary springs there is sufficient water for vessels of 15 feet draft and at neaps for those of 9 or 10 feet. A regular depth is maintained by daily flushings from the canal. The tide begins to flow into the harbor about three hours after the commencement of the flood on Cayeux Beach, and it fills in about 2½ hours; at 4 hours ebb it is quite dry.

There is a small gridiron at St. Valery, 98½ feet in length, with a width of 23 feet.

Coal can be obtained at St. Valery, about 650 tons being kept in stock.

Harbor lights.—A fixed green light, elevated 25 feet above high water and visible 4 miles, is exhibited from a white iron pillar at the end of the towing path in front of St. Harold's Tower, St. Valery.

A fixed red light, also 25 feet above high water and visible 4 miles, is exhibited from a white iron pillar at the molehead on the port hand in entering the harbor.

Canal de la Somme, on the left or southern bank of the river, is 7.3 miles in length; it commences at the village of Sur-Somme, 2 miles below Abbeville, and terminates at the head of St. Valery Harbor in a lock 275 yards long and 55 yards wide. The two entrances of the lock are both 28 feet wide; the outer sill is 16 feet above the zero of soundings, and therefore has 16 feet over it at high-water springs and 9½ feet at neaps; the inner sill rather less. Vessels are restricted to a speed of 5 knots in the canal; with a fair wind they sometimes sail, but horses are always in readiness to track them. The mean depth of water maintained in the canal is 11½ feet; it can, however, be raised to 18 feet. The maximum draft of vessels admitted into the canal is 11 feet, and at Abbeville there is not swinging room for vessels over 145 feet in length. The canal is crossed by four bridges with openings, of which the smallest is 29½ feet in width.

Port d'Abbeville, in the western part of the town of Abbeville, extends 600 yards along the right bank of the Somme, from the ramparts to the bridge which unites the Hocquet and the Marcadet quarters of the town. A quay extends the whole length of the port, and the railway runs alongside it; the river is sufficiently deep along the side of the quay to admit of vessels drawing 11 feet remaining afloat. About 60 small vessels arrive at Abbeville by the canal yearly, their total tonnage being about 6,000 tons. The town contains about 18,000 inhabitants, but though walled and formerly a place of some strength, is no longer classed as a fortress. Being on the railway line between Amiens and Boulogne it is in direct communication with Paris.

Crotoy.—The port consists of a natural creek sheltered from the sea by the little promontory on which the town of Crotoy stands. The harbor works comprise wooden pile work on the side of the town forming the quay, and on the other side a reservoir or Bassin de Chasses for flushing and keeping open the channel; at the head of the harbor the Canal de Maye conducts the waters from the pond at Rue and Favieres Marshes into the Somme, and contributes to keep the entrance open.

Crotoy occupies an advantageous position as relates to the circuitous course the flood stream takes in the mouth of the Somme during the time it has most strength; it is equally accessible with the prevailing winds by either Pass, and the channel up to the entrance of Crotoy is almost always 3 feet deeper than either that to Hourdel or St. Valery; nevertheless, the construction of the Canal de la Somme, on the opposite shore, has entirely destroyed its trade, which, beyond the few fishing boats belonging to the harbor, is now represented by about a dozen vessels calling annually.

Harbor light.—A fixed white light, visible 6 miles, is shown at an elevation of 41 feet above high water from a wooden gibbet on the promontory of Crotoy.

Bancs de la Somme.—The off-lying banks, generally called the Somme Banks, are the Bassurelle de la Somme, the Quemer, the Battur, and the southwestern part of the Bassure de Baas. Those dangerous banks lying in Dover Strait, the Varne, Ridge or Colbart, Bassurelle, Ridens, and Vergoyer, are fully described in British Islands Pilot, Volume I.

There is always sufficient water on the Somme Banks to admit of vessels crossing them when bound for the mouth of the Somme. From the southwestern end of the Bassure de Baas the land can be seen only in fine weather; the eddies on the banks occasion a heavy sea when it blows hard, but the soundings on them differ sufficiently from those in the channels between to enable the mariner to know his position with reference to the banks and the land. The Quemer and the Bassurelle de la Somme appear to be extensions of that immense mass of sand and broken shells which forms the submarine slope along the shore from St. Valery-en-Caux to the mouth of the River Canche.

The Bassurelle de la Somme and the Quemer spread southwestward across the mouth of the Somme; the Quemer ends about 10.5 miles 284°, and the Bassurelle de la Somme 10 miles 270° from Cayeux northeast lighthouse. Neither of these are dangerous, except on a patch ½ mile in extent about 2 miles within the southwest end of the latter bank, where the depths are from 4¼ to 5 fathoms. Both banks are, however, joined to the shore by a shoal bottom on which the depth is less than 5 fathoms, and which extends nearly 5 miles into the offing. This shoal bottom terminates in two points projecting in the direction of the banks, the first 8 miles 244° from St. Quentin Point, the other 7 miles 239° from Routhiauville Point; the latter has only 17 feet water at 5 miles from the point, a little to the southward of that bearing.

The Battur is in the channel separating the Quemer and Bassurelle de la Somme from the Bassure de Baas, and carries a depth of from 6 to 8 fathoms. It is not dangerous to vessels of any draft, but the eddies over it cause a heavy sea when it blows hard. It is 8.5 miles long 42° and 222° within the 10-fathoms line; from its southwestern extreme Cayeux northeast lighthouse bears about 126° 13 miles; and from its northeastern end the lighthouse on Haut-Banc Point 106° 6.5 miles.

The Bassure de Baas is a narrow bank of sand and shells, about 35 miles long from its northern end, which is about 4 miles 200° of Cape Gris Nez and 1.5 miles from the shore just southward of Audrecelles; it follows nearly the direction of the coast as far as the mouth of the River Canche and then curves gradually westward, terminating about 17 miles from the shore a little southward of the parallel of the mouth of the River Authie, and 18 miles 300° from Cayeux northeast lighthouse. From its northern end, as far as 5 miles southward of the Canche, it is dangerous to vessels of deep draft, and at low water its highest parts may be touched by vessels of light draft when there is any sea on.

During a recent examination of the northern part of Bassure de Baas, the shoal heads, in approximately lat. 50° 40¾′ N., long. 1° 31′ E., could not be found, soundings of 7, 8, and 10 fathoms being obtained over an area 1 mile in extent on and around the above position. The result of this survey, it is considered, shows that the depths on this part of the bank are greater than those shown on the chart.

The shoalest and most dangerous spot is a small flat, 600 yards long 98° and 278°, with only 12 feet on its eastern part and 16 or 17 feet on its western end, from which the column of the Grande Armee, sometimes known as Buonaparte's Column, ¾ mile northward of Boulogne, bears 46°; Cape Alprech Lighthouse, 56° 2 miles; and the summit of Mont St. Frieux, 140°. The sea breaks with great violence on the whole of this flat during strong westerly winds.

For 14 miles southward of this flat, as far as 247° 9 miles from Touquet Point Lighthouse, the shoalest parts of the Bassure de Baas form a succession of long, narrow flats where the depths vary from 18 to 26 feet and where the sea breaks heavily when it blows hard from the westward. There are no dangers in the channel between the bank and the shore, but with a strong breeze and weather tide a high sea runs on some shoals spots of from 5½ to 8 fathoms lying nearly in the middle of that channel. During bad weather, with winds between west by south and northwest by north, the sea is less disturbed in this channel than outside the Bassure de Baas, especially from abreast of the mouth of the Canche northward to Cape Alprech.

Light and bell buoy.—A light and bell buoy, painted in black and white horizontal stripes and showing a group-flashing white light, is moored in a depth of 6½ fathoms off the north end of the Bassure de Baas, 275° nearly 2 miles from Ableteuse Fort. The light is elevated 23 feet above the level of the sea and should be visible 7 miles.

The Vergoyer is a sand bank about 15 miles in length northeast and southwest within the depth of 10 fathoms, and 1.5 miles in breadth; its northeast end is 9 miles and its southwest end 18 miles from the French shore.

The general depth on its southwestern part is from 6 to 8 fathoms; the southeastern side is steep-to, and the northwestern edge of a gradual slope; near its northeastern end is a flat spot about 1 mile in diameter, with only 2 fathoms water on its shoalest part. From this part, which is about 10 miles offshore, in clear weather the land may be distinctly seen from the hills, at the foot of which stands the town of Etaples, to Cape Grisnez. The lighthouse on Cape Grisnez bears from it about 31° 19 miles, and the lighthouse on Cape Alprech 60° 11 miles.

Clearing marks.—Mount Lambert, midway between Outreau Church and Alprech guardhouse 72° leads northward. The tide ripples on this shoal during springs occasion a high sea with a weather tide, and with a strong breeze, from whatever quarter it may blow, the sea breaks with violence upon the northeastern end, especially from half ebb to half flood.

Lightbuoys.—Two lightbuoys mark the northern end of the Vergoyer:

(*a*) A red buoy, showing a green gas light, is moored on the west side; from it Cape Alprech Lighthouse bears 60°, distant 11.1 miles, and Haut-Banc Lighthouse 140°.

(*b*) A black buoy, showing a red gas light, is moored on the eastern side; from it Cape Alprech Lighthouse bears 60°. distant 11.1 miles; and Haut-Banc Lighthouse 142°.

It should be borne in mind that lightbuoys at such a distance from the shore can not be closely watched, and therefore implicit reliance should not be placed on the lights being seen or on the buoys being in position.

On the shallowest part of the Vergoyer Bank, and on the line between the two gas buoys, there is a spar buoy painted with red and black horizontal stripes.

Directions.—As the eastern side of the Bassure de Baas is steep-to, the lead is an uncertain guide for avoiding the 12-foot patch on its northern part when running through the channel between the bank and the shore, but by steering 206° with Creche Point astern seen just inside of Heurt Fort a vessel keeps in midchannel when between the parallels of Gravois windmill and the guardhouse on the hills ¼ mile northward of Brone Rivulet.

In thick weather, when the light buoys marking the northern end of the Vergoyer may not be seen, great attention should be paid to the lead when approaching the channel between the Bassure de Baas and the Vergoyer from the northward, for the latter bank presents a steep projecting point approaching the French coast at the outer edge of the 20-fathom line of soundings. A vessel running from the southward through this channel, which is 5 miles wide and carries a depth of from 14 to 23 fathoms, avoids the Vergoyer by keeping in from 15 to 16 fathoms throughout the whole length of the channel.

The coast.—From St. Quentin Point the coast, which is low and bordered by ranges of sand hills, trends 6° 4.5 miles to Routhianville Point, at the southern side of the mouth of the River Authie, and the only objects rising above the sand hills and visible in clear weather are the tall spire of St. Quentin Church and the windmill at Royons. The intermediate shore is fronted by a strand which dries 1.5 miles southwestward from St. Quentin Point and west 1.3 miles from Routhiauville Point; between these points it dries out from 1,000 to 1,200 yards.

Caution.—Great caution is necessary to avoid being caught on this part of the coast by strong westerly winds, for they cause a high sea over the shoal bottom extending 5 miles from the shore and increase the speed of the flood, which in calm weather runs at the rate of 3 knots to the northward. The same winds also decrease the rate of the ebb, and no dependence can be placed on the strength of this stream to assist a vessel in clawing off the coast.

The estuary of the Authie is comprised between Point Routhiauville and Haut-Banc or Berck Point, which bear about north and south 2.5 miles from each other, and extends eastward 2.8 miles to its head, where it is about 600 yards wide, with the River Authie flowing into it from the southward. The entrance is filled with an accumulation of sand and broken shells, which dries at half tide, and at low-water springs uncovers 1.3 miles westward of the meridian of Haut-Banc Point. Routhiauville Point is a mass of sand hills, and the only remarkable object near it is a guardhouse standing among the highest hills about 400 yards southward of the point. A sand bank, barely covered at high-water neaps, joins this point and extends in a circuit of more than a mile between the bearings northwest by north and northeast by north from the point. A similar bank surrounds Haut-Banc Point and projects a mile between the bearings southwest by west and southeast by south from the point.

The channel into the Authie is principally kept open by the flood stream, which sets in with great rapidity until the banks are covered. The entrance is between the banks just described, and the channel varies in position by the shifting of the banks, and is sometimes divided into two passes; it runs in an easterly direction from the outer edge of the sands, and terminates in a narrow trench alongside a low, rough stone dike, constructed in order to turn the ebb stream away from the northern bank and thus put a stop to the erosion of that bank and of Haut-Banc Point. Fishermen haul their boats up here, and the channel is marked by little red and black buoys, but the changes are so frequent that it is quite possible the channel may eventually fill up altogether.

Depths.—The bottom of the grounding places and the higher parts of the channel are 15 or 16 feet above the zero of soundings. The water rises in the channel and at the grounding places about 5 feet at the lowest neaps, about 7½ feet at mean neaps, about 14 feet at ordinary springs, and 2 or 3 feet higher at equinoctial springs.

The banks of the Authie have undergone great changes of late years, the tendency of the estuary being to move bodily northward. Between 1835 and 1878 Routhiauville Point advanced about 550 yards northward and Haut-Banc Point receded about 450 yards in the same direction. The dike referred to is of modern construction and, with other works for the protection of the northern shore, seems, since 1882, to be fairly answering its purpose.

Haut-Banc or Berck Point may be easily recognized by day by its circular white lighthouse and guardhouse standing near it on the sand hills, which are sufficiently high to be seen in clear weather 7 or 8 miles distant, and by the still more conspicuous hospital, a large building close to the shore, erected by the municipality of Paris for the treatment of invalid children.

Light.—From Berck Lighthouse, on Haut-Banc Point, a white circular brick tower on a building 87 feet high is exibited, at an elevation of 117 feet above high water, a flashing white light. The light is visible 16 miles, but is obscured through half a degree by the hospital tower when bearing 171°.

A lifeboat is stationed near the lighthouse, and there is also a mortar apparatus and other life-saving appliances.

Directions.—The mouth of the River Authie is dangerous to approach during the flood, especially with westerly winds, as the stream then runs in with great rapidity and might draw a vessel on the banks where she would almost certainly become a total wreck; the buoys meant for the use of small fishing vessels of about 5 feet draft belonging to Groffliers are not sufficient guides for a stranger to enter the channel. No vessel, indeed, however light her draft, should attempt the entrance, unless in charge of one of the Berck or Groffliers fishermen, who alone are in a position to know the changes taking place in the channel.

The coast from Haut-Banc Point trends north by east 8 miles to Touquet Point at the entrance of the River Canche. The shore is low, sandy, and bordered by a range of sand hills of moderate height. A sandy strand ½ mile wide uncovers at the foot of the sand hills and joins the accumulation of sand which obstructs the entrances of the Rivers Authie and Canche. The low plain adjoining the shore extends to the foot of the hills 3 or 4 miles inland and is divided in its whole length into two nearly equal parts by a chain of sand hills, much higher than those near the beach, and which may be seen 8 or 9 miles distant. This chain of sand hills may be mistaken for those bordering the beach, although they are 1.5 or 2 miles inland, and it is important to guard against this mistake when turning to windward inshore in hazy weather.

The objects which serve as distinguishing marks on this part of the coast are the windmills of Verton and St. Josse, on the hills in the interior; the chain of hand hills just described; the lighthouses on Haut-Banc and Touquet Points; the hospital, windmills, and church tower at Berck-sur-mer, the latter standing on the plain 64° 1.5 miles from Haut-Banc Point is an excellent landmark; and the semaphore station southwestward of Touquet Point Lighthouse.

The inhabitants of Berck, Merlimont, and Cuque fit out about 50 fishing boats of from 2 to 9 tons burden, which they generally beach at high water just northward of Haut-Banc Point.

The estuary of the Canche, known locally as the Bay of Etaples, is 2 miles wide between Touquet and Lornel points, the southern and northern limits of the entrance, and runs 3 miles inland in a southeast by south direction. Like the estuaries of the Somme and the Authie, it is filled by a mass of sand and broken shells which is left dry at half ebb and uncovers at low water about 1 mile outside the general line of the coast. And, like the Authie Estuary, it inclines to move bodily northward and also to become narrower, Touquet Point having extended northward 330 yards between 1835 and 1878 and Lornel Point having receded about 200 yards in the same period, and this northward movement still continues. The entrance points and shores of the river consist of sand hills of moderate height, of which the shapes are frequently changed by westerly gales.

Etaples.—From Touquet Point the southern shore of the estuary trends southeast by east as far as abreast of the small port of Etaples, a place with about 3,000 inhabitants, which, in ancient times, was of considerable importance, but has now only its rather extensive fishery, the general trade having been entirely destroyed by the silting up of the bay, which now only admits vessels of about 9 feet draft, at springs, as far as Etaples; the grounding berths, of muddy sand, are on the northwestern side of the town, where there is a wooden quay and mooring posts. The northern shore of the estuary is low and winding; between Etaples, which stands on the northern bank of the River Canche, and Lornel Point, its general trend is west by north and the two shores converge toward each other, the river, abreast of the town, being very narrow.

The surf and westerly winds heap up the sand round Touquet Point, where it forms a bank barely covered at high water, neaps, and extending in a circuit of nearly a mile between the bearings west by north and north by east from the point. This bank shelters the inner part of the bay, and fishing craft unable to reach Etaples in one tide lie aground in the channel in safety under its lee. A similar bank lies in front of Lornel point and extends nearly a mile in a west by west direction. Between these banks is the entrance channel to the river.

Depths.—Between Touquet Point and Camiers Lighthouse the bottom in the channel is 13 feet above the level of the lowest tides, and consequently there is a depth of only 19 feet at high water, springs, and 13 feet at neaps; from the outer end of the dikes (presently described) to Etaples there is from 5 to 7 feet less water. At Etaples Quay the depth is 3¼ feet at high water of the lowest neaps; 7 feet at mean neaps; and 10½ feet at ordinary springs. The tide begins to rise at Etaples about 1½ hours before high water, and the harbor dries about 3 hours after high water.

Tides.—It is high water, full and change, at the entrance of the estuary of the Canche at 11h. 20m.; the rise is 32 feet at springs, and 26 feet at neaps, above the zero of soundings. The rising tide does not check the stream of the Canche until about half flood. Both streams are very rapid through the channel so long as the banks are uncovered, but their rate does not exceed 3 knots during the last hour of the flood and the first hour of the ebb. With westerly gales, the sea is high at the entrance, and the waves caused by a strong southwesterly wind cross it obliquely.

The entrance channel runs between the banks, as described, in an easterly direction toward Camiers Lighthouse on the northern shore of the river; from thence it is between two submersible dikes of rough chalk stones, before referred to, for nearly 2½ miles up to and abreast of Etaples, where the western dike end is connected with the southern shore. The channel is only about 70 yards wide abreast of the town quays, but between the dikes it is double that width. The western dike is marked by red beacons with conical top marks, the eastern dike by black beacons with cylindrical top marks, the outer beacon in each case marking the end of the dike.

Half a mile above Etaples the viaduct of the Northern Railway crosses the river. By means of this line the town is in direct communication with Boulogne on the north, and also with Amiens and Paris.

Pilots.—Two pilots and an assistant pilot are stationed at Etaples. When they are unable to get out to a vessel they come as far as the weather permits and signal by hand the direction to be taken. The smallest vessel, unless having local knowledge, should not attempt this channel without a pilot.

Buoys.—The edge of the sands off the estuary of the Canche is marked by two large buoys, viz: A black spindle buoy to the northward and a red bell buoy to the southward, 1.8 miles 275° from Touquet Lighthouse; these buoys are about 1.3 miles apart. The channel between the banks up to the dike ends is well marked by red and black buoys, the positions of which are frequently altered to meet the changes in the passage.

Lights—Touquet Point.—From a white octagonal tower, 169 feet in height, on Touquet Point, an electric group-flashing white light is exhibited, at an elevation of 174 feet above high water, visible 20 miles.

Camiers.—From a white square stone tower 33 feet high, on the northern side of Canche River entrance and at an elevation of 56 feet above high water, is exhibited a fixed red and white light, unwatched, visible seaward between Points Lornel and Touquet. It shows red over the highest parts of the banks which separate the two existing channels into the Canche and white elsewhere. The white light is visible 9 miles, red light 5 miles.

Semaphore.—There is a semaphore station about a mile southwestward from Touquet Point and half that distance from the lighthouse.

Directions.—At night, the heavy sea and sand banks at the mouth of the River Canche may be avoided by keeping Cape Gris Nez Light well open westward of Cape Alprech Light. By day, the extreme of Cape Gris Nez should be kept about 6° open westward of Cape Alprech.

Though vessels should never attempt to enter the Canche without a pilot or some person of local experience, they may be driven to do so by bad weather or by finding themselves embayed amongst the sand banks. The pilots reside at Etaples, and as it is impossible for them to board vessels outside when it blows hard from the westward, they then meet under shelter of the bank extending from Touquet Point.

Vessels without pilots seeking shelter should endeavor as soon as possible to get sight of the outer red bell buoy, and it is important not to pass northward of the parallel of Touquet Point before the buoy is sighted, for, if set too far northward by the flood stream, which is running at its greatest strength outside the banks at the time of high water at Etaples, it is impossible to regain the entrance.

The most favorable time for entering the Canche is about one hour before high water, for the stream then runs into the channel with sufficient strength to assist a vessel in threading her way and the water still rises enough to float her should she take the ground. Pass between the black and red buoys, leaving the black to port and the red to starboard, as usual. At springs pilots place vessels drawing 10 or 11 feet water, when not bound to or unable to reach Etaples, in the elbow above Touquet Point; here they lie in safety even during westerly gales, protected by the high bank which joins Touquet Point, and which dries from 21 to 23 feet above the level of the lowest tides.

Caution.—The very low land, coupled with the dangers bordering the shore, render the navigation between Cayeux and the mouth of the Canche extremely dangerous in foggy or snowy weather or during westerly gales accompanied by rain, when the weather is generally dark, the land covered with mist, and the most brilliant lights difficult to distinguish. Moreover, with these gales a few hours suffice to raise a heavy sea in the eastern part of the channel, and especially on the edge of the great submarine slope which extends offshore from St. Valery-en-Caux to the River Canche, and this alone causes a considerable drift; but in addition westerly gales tend to drive the water toward the head of the bight formed between Capes d'Antifer and Gris Nez and greatly influence the direction of the tidal streams. It may be seen, therefore, how important it is that a vessel should not run into the eastern part of the channel without her position being well ascertained by bearings of Cape Barfleur Light or of St. Catherine's Light, Isle of Wight, and without using every precaution after these lights are lost sight of.

The only safeguard is the frequent use of the lead; and if lights can not be distinguished or the position is from any cause doubtful, vessels should keep in at least 20 fathoms water whatever be the time of tide; this not only keeps a vessel clear of the dangers near the shore, but also of the off-lying banks between the mouth of the Somme and Dover Channel.

The coast from Lornel Point trends northward 8.3 miles to Cape Alprech, and from thence northeast by north 2 miles to Boulogne. The shore is low, bordered by sand hills of moderate height, and runs in a straight line from the mouth of the Canche to that of the Brone Rivulet, which finds its way into the sea 2 miles southward of Cape Alprech and is the northern limit of the low sandy shore forming the coast line for the whole distance of 34 miles from the town of Ault, near Treport. A mile northward of the rivulet the coast is low, with hills sloping down toward it, and on their sides several houses of the village of Equihen may be seen; beyond this the coast is steep, and consists of clay and of schistose rocks of a dark gray color.

The high land separating the courses of the Rivers Canche and Liane, which latter runs into the sea at Boulogne, extends westward to within 1.5 miles of the shore and terminates near the meridian of Etaples in a chain of hills, of which many are sufficiently high to be seen in clear weather 25 miles distant. These hills are excellent landmarks for the pilots, who calls them the Terres de Tourmont, or Tourmont Land.

At 1.3 miles inland, and in front of the Tourmont Land, is Mont St. Frieux, 505 feet in height, and one of the most remarkable objects between the River Canche and Boulogne. It consists of four mounds or hillocks, very near each other, rising from the same base and occupying a space of about 1 mile. From its isolated position and height Mont St. Frieux may be seen in clear weather 25 miles distant.

On the highest of the hills northward of the Brone Rivulet is the church of St. Etienne-au-Mont, and near Alprech a mill, both of which may be seen a considerable distance at sea. The sandy beach which borders the shore almost to Cape Alprech uncovers at low water half a mile from the foot of the sandhills, but northward of the Brone Rivulet the width of sand gradually decreases and the shore is bordered by a shelf of irregular rocks, which dry 200 yards outside high water mark.

Cape Alprech is a perpendicular rocky cliff of a brownish red color, 135 feet above the level of high water; the foot of the cliff is skirted by a shelf of rock covered with bowlders which dries 200 yards out of low water. From the cape, the coast turns sharply northeastward, and is high and steep-to within 800 yards of the jetties of Boulogne.

Lights.—A square white lighthouse, on rectangular base 33 feet high stands on the summit of Cape Alprech about 87 yards from the edge of the cliff, near the tower of the old semaphore, and 2.3

miles southwestward from the entrance to Boulogne. From it is exhibited at an elevation of 184 feet above high water, a group-flashing white light, visible 15 miles.

A fixed white leading light is shown from a small iron shed 353° 164 yards from Cape Alprech Lighthouse; it is elevated 144 feet above high water, and visible 9 miles. The two lights in line lead 450 yards seaward of the elbow of the Carnot Breakwater.

Semaphore.—There is a semaphore station on Cape Alprech just southward of the lighthouse.

Portel.—The coast between Cape Alprech and Boulogne is intersected by valleys, and at the entrance of the largest is the village of Portel. This valley, 1,200 yards 42° of the cape, is inclosed by high land, and on the summit of the hill on its northern side stands the fortress of Mont Couple.

The rocks, which uncover at low water, extend 800 yards offshore from Portel, and on their summit, 351° about 1,200 yards from Cape Alprech Lighthouse, is Heurt Fort, from which the Lineur sunken rocks project 329° 500 yards, and a heavy sea runs on them with a fresh southwesterly wind.

The fishermen of Portel have about 40 boats; during the fine season they ground them on the southwestern side of a small beach in front of the village, where they are sheltered during the greater part of the tide by the surrounding rocks. When the weather is threatening they haul them up above high-water mark and place them in the bed of a rivulet which runs through the valley; in winter they take shelter in Boulogne Harbor.

Boulogne.—This port, occupying the entrance of the valley of the Liane, has during late years undergone great alterations and improvements, and although a large portion of the projected plans have been abandoned, enough has been done to render it one of the most convenient and best sheltered of the French channel ports.

The principal objects recognized when approaching Boulogne are Mont St. Frieux, already described; Mont Lambert, fortified, 2 miles to the eastward, the highest land in the neighborhood of Boulogne; and the column of the Grande Armée on the high land a mile northward of the town. The entrance to the harbor bears 289° from the summit of Mont Lambert and 247° from the column; the former is 604 feet, and the head of the statue on the column 448 feet above the level of high water.

Outer harbor.—With the object of inclosing a large water space outside the port affording shelter from the prevailing westerly winds, of which space a great portion should be available for ships of the deepest draft at all times of tide, the Carnot Breakwater, of stone and of the most solid construction, has been completed. It starts from the shore under the Chatillon Cliff, a mile southwestward of the harbor entrance, and runs out 1,410 yards in a 317° direction; it then curves for about 220 yards until its direction becomes 19°, when it runs a farther distance of about 715 yards, the whole extent of this magnificent work being 2,345 yards. A white masonry lighthouse stands near its extreme end, and a small light structure 1,230 yards from the inner end bearing 175° 950 yards from the above lighthouse.

Whistle buoy.—A red automatic whistle buoy with a special top mark is moored 336° 550 yards from the lighthouse on the northern arm of Carnot Breakwater.

Depths.—The depth of the channel of access to the outer harbor is being increased from 32 feet to 33½ below the zero of soundings. The dredged space is now about 350 yards wide, and has 29½ feet of water at the lowest tides.

Works connected with the extension of Carnot Breakwater are in progress.

The Carnot Breakwater protects an anchorage about 74 acres in extent, called the outer or deep-sea harbor, of which, however, although the work is always in progress, only a portion has yet been dredged, viz, a space about 800 yards long and 300 yards wide next the outer arm of the breakwater, affording shelter in about 25 feet at the lowest tides. At 100 yards inshore of this space there is as yet only from 3 to 6 feet water, and the shallow part extends to the beach; the dredging of an area of 40 acres to a depth of from 27 to 32 feet has, however, received Government sanction. Alprech Lighthouse in line with the light structure on the inner arm of the breakwater or the lights in line at night leads along the central line of the anchorage and up to the westernmost of two large mooring buoys 130 yards apart. The large mail steamers use this anchorage for the transshipment of cargo and passengers.

In the southern corner of this outer harbor and at the inner end of the breakwater is a small harbor, dry at low water, constructed for the use of vessels loading with stone in the building of the breakwater and now but little used; other large works for the prospective accommodation of shipping are in various stages of progress between it and the port of Boulogne.

The Port of Boulogne is formed at the mouth of the Liane, a small river whose waters are abundant during rainy seasons or at the melting of the snow. It consists of an entrance channel, Avant Port, Tidal Port, Inner Port, and Bassin-a-Flot, or wet dock.

The town has a population of about 53,128; it is divided into Chatillon and Capecure on the western side, and St. Pierre, Basse Ville, and Haute Ville on the eastern side of the harbor; it is built in the form of an amphitheater in and on the sides of a valley inclosed between high hills. The buildings most easily recognized from the sea are the bell tower and cupola of the cathedral in Haute Ville, the church spire in Basse Ville, the marine baths, the windmill halfway up the hill southeastward of the baths, and the Church of St. Pierre des Marins on the cliff.

A radio station is established at Boulogne, which is always open to the public; call letters, F F B.

The United States is represented by a consular agent.

Entrance channel.—The entrance to the port is perfectly sheltered against the prevailing westerly winds by the Carnot Breakwater, which has also modified to so great an extent both the strength and direction of the tidal streams as to have rendered the harbor comparatively easy of access. The two piers inclosing the channel are of unequal length and run out across a sandy strand which extends beyond the pierheads and uncovers 700 yards from the shore at the lowest tides. The piers are 230 feet apart, and from the entrance, which has a southeast direction, curve slightly eastward.

The southwest pier projects about 150 yards beyond the northeast pier and consists of stonework up to the level of the highest tides, on which is wooden pilework the whole length of the pier. The northeast pier, 547 yards long, curves and lies parallel with the southwest pier, and also consists of a stone foundation, rising to the level of the sands only, and surmountd by open pilework. This pier is prolonged by a submersible dike about 500 yards long, composed of rough stonework for 150 yards and continued in strong pilework the remainder of its length; the top of this dike is from 3 to 9 feet above the level of low water.

A report dated 1908 states that although Boulogne was entered under perfect conditions of tide and weather, it did not compare in any way with Calais, being narrow, both between piers and in the harbor; turning the vessel in the harbor is somewhat difficult, and will be more so when the works at present in progress are completed. The harbor and entrance are much blocked by fishing boats, especially during the herring season, from October to February.

A new northeast pier is (1913) under construction; it is intended to provide a wider channel into the harbor, which also will be dredged to 16½ feet below the hydrographic zero. This will give a depth of 19¾ feet at L. W. O. S.

The inner end of the southwest pier is in course of demolition. The works are marked by day by a red flag and by night by a white light.

Shoal northward of entrance channel.—A shoal lies just to the northward of the entrance channel at a distance of 820 yards 333° from the lighthouse on the south jetty. It has only 2 feet over it in the position given and extends for a distance of about 260 yards in a southerly direction from this position, with a depth of about 6 feet over it.

Caution.—Vessels coming from the northward and bound for Boulogne Harbor should pass outside this shoal. By night the shoal will be avoided by keeping within the sector of red light shown from the lighthouse near the elbow of Carnot Breakwater.

The Avant Port is immediately within the piers, and through it is the channel to the Tidal Port, of which it may be considered the outer part; from it is also the entrance to the Bassin-a-Flot, as well as to the Loubet Basin, under construction.

The Tidal Port is the most important division of the harbor. At its southern end is the Inner Port, which serves as the reservoir, or Retenue de Chasses, for flushing the channel, and which might at any time be utilized for shipping if required. The inner end of the northeast pier joins the Quai Gambetta, which extends the whole length of the Avant Port and Tidal Port, a distance of about 950 yards; on this side are berthed the Thames steamers, and here are the landing places for the goods traffic of the Southeastern Railway. On the western side is the Quai Chanzy, which separates the Tidal Port from the Bassin-a-Flot, and at its northern end is the railway station and the landing stage for the Folkestone steamers.

Depths.—The port admits vessels of the deepest draft at high water, springs, and of 28 feet draft at neaps. There is a clear channel up to the pierheads with a depth of 13½ feet at lowest possible tides, at which time the least depth between the piers and through the Avant Port is 11 feet. At low water, ordinary springs, the depth alongside the Gambetta and Chanzy Quays is 12 and 13½ feet, respectively.

The Bassin-a-Flot or wet dock is on the western side of the Tidal Port, and its entrance is through a lock at its northern end. The Bassin has an area of 17 acres, being 423 yards long, 210 yards wide, and with a quay frontage of 1,143 yards. The lock has double gates, the entrance is 69 feet wide between them and 328 feet in length; the depth over the sills is 29 feet at high water, springs, and 23½ feet at neaps. The dock itself has rather more water, but the bottom is hard and only lightly coated with mud. The lock gates are open from 3 to 3½ hours every tide.

Depths.—Silt is reported to have accumulated off the southeast elbow of the southwest jetty opposite the lifeboat house; vessels entering or leaving the harbor should carefully keep in the center of the channel.

A floating dock has been placed in the Bassin-a-Flot; it can lift vessels up to 1,300 tons with draft of water not exceeding 16½ feet.

The Loubet Bassin.—This tidal dock is accessible to shipping, though the dredging between it and the harbor channel is not fully completed. Out of the 20 projected electric cranes, 5 are now (1913) in working order.

It is on the southwestern side of the Avant Port, from which it will be entered, at the eastern corner of the Outer Port and partly on the site of the former Ancienne Batterie, now demolished. It will be 350 yards in length, with a mean breadth of 192 yards; the depth at the northern quay will be 13 feet, and alongside the southern quay 25 feet, at low water.

Supplies—Coal.—Stores and supplies generally are cheap and plentiful. Thirty retail coal merchants hold small stocks, constantly replenished, chiefly from regular Goole liners and by rail from Pas de Calais mines. Practically the only bunker coal shipped is that taken by the fishing fleet, mainly Pas de Calais coal, delivered alongside by rail. Vessels coal without difficulty either in the Tidal Port or in the Bassin-a-Flot.

Repairs to hull and machinery can be effected, but there being no dry dock, serious defects of hull can not be made good. There is a slipway for building or repairing small vessels. There are several cranes with lifting powers from 3 to 40 tons.

Gridirons.—There are two gridirons in the southwest angle of the tidal port, the larger of which, 316 feet in length and 27 feet in width, will take a vessel of 1,500 tons displacement; the other gridiron is for small craft. There is a careening place adjoining the slips.

Trade, etc.—The general trade of the port is extensive. The principal imports are coal, wool, machinery, iron ore, timber, beer, jute, cotton, etc.; the exports, wine, spirits, cement, fruit and vegetables, Parisian articles, etc. The herring and mackerel fisheries employ a considerable capital and several vessels are fitted out for the Iceland cod fishery; the coasting trade is active. Three lines of trans-Atlantic steamers make this a port of call. There is daily communication by steamer with Folkestone, thus connecting the South-Eastern Railway of England with the Northern Railway of France; several times a week steamers run between Boulogne and London and Goole.

Fisheries.—Boulogne is the chief fishing port of France and furnishes about one-seventh of the whole fishing fleet of the Republic; it comprises 404 vessels, viz, 31 large and 28 small steamers, 84 large sailing vessels, and 261 ordinary fishing boats.

Lights.—The following lights mark the Carnot Breakwater and the entrance to Boulogne Harbor:

Carnot Breakwater.—From a white masonry turret 39 feet high, on the reservoir, 800 yards from the end of the breakwater under construction, is exhibited at an elevation of 42 feet above high water an occulting white light, visible 8 miles.

Also, on the inner arm of the Carnot Breakwater, in a position from which the occulting light on the breakwater bears 356°, distant 950 yards, a fixed red light is exhibited, elevated 11 feet above high water and 5 feet above the top of the breakwater, visible 7 miles on the bearing of 184°, the light decreasing in power toward the limits of its sector of visibility. This light, in line with Cape d'Alprech light, 184°, marks the center of the anchorage.

Light buoy.—A cylindrical light buoy, painted red, and exhibiting a fixed green light, is established at a distance of about 200 yards 15° from the outer end of Carnot Breakwater extension works. The position of this buoy will be altered as the works progress.

Southwest pier—Tide lights.—From a turret surmounting a rectangular iron building 32 feet high, painted white, on the head of the southwest jetty, and at an elevation of 40 feet above high water, a light is exhibited, showing different characteristics to indicate the state of the tide.

The depth of water into the harbor at any moment may be obtained by adding the height indicated by the flashes to the depth given on the chart.

The white light is visible 8 miles, red 7 miles, and green 6 miles.

Northeast pier.—A fixed red light, visible 4 miles, is exhibited at an elevation of 35 feet above the level of high water, from a white metal turret 27 feet high, at the northeast pierhead.

Occasional lights.—Ten arc lights have been established in the entrance to the inner harbors; four are exhibited from the top of white beacons on the southwest pier, four from the top of white masts on the northeast pier, and two from white masts on the quay east of the Avant port. These lights are elevated 53 feet above high water, and are lighted for about 20 minutes, between 5 and 8 o'clock in the evening, for the arrival and departure of passenger steamers.

The four lights on the southwest pier are lighted besides for about a quarter of an hour, when asked for by those interested, on the arrival or departure of large vessels.

Quai Chanzy.—At the north extreme of Quai Chanzy a fixed red light is exhibited from a metal support 70 feet high, painted white, at an elevation of 76 feet above high water; the light can be seen from a distance of 14 miles. For arc of visibility see Light List.

Fog signals.—During fogs and thick weather a fog trumpet is sounded on the southwest pierhead. Should the sirens be damaged, a bell is sounded.

The suspension of all movement in the port to facilitate the entrance or departure of a vessel is signaled during the day by the hoisting of a red flag bordered with green at the southwest pierhead and at the pilot station; at night, by a red light over a green light at each of those stations.

When the sluices of the scouring waters are going to be opened a blue flag and black ball are hoisted at the southwest pierhead flagstaff, and also at a staff near the sluice gates.

Other signals are made from a mast at the inner end of the northeast pier. A blue triangular flag indicates a ship approaching; a red triangular flag by day, or a red light at night, signals the approach of one of the regular Folkestone packets.

Tides.—It is high water, full and change, in the port of Boulogne at 11h. 28m.; ordinary springs rise 28½ feet, neaps 23 feet above the zero of the soundings, which is that of the lowest possible tide, or about 3¼ feet below the level of low water, ordinary springs. Ordinary springs range 25¼ feet, neaps 15¼ feet. Strong westerly winds raise the tide a foot or two higher, and those from the eastward have a contrary effect. At springs high-water slack lasts about 20 minutes with westerly and 15 minutes with easterly, winds; at neaps, about 40 minutes.

At a distance of about 400 yards from the pierheads, Boulogne, it is slack water for about a quarter of an hour at 2¼ hours before high-water spring tides and at 1¾ hours before high-water neap tides. The ebb tide after slack water quickly attains the speed of 3 knots at springs and never less than 2 knots at neaps. Vessels of 19 feet draft and wishing to enter the port should therefore be in the above position at slack water, as pilots refuse to take in vessels 250 long at other times.

Tidal streams.—At 3 miles westward of Boulogne, outside the Bassure de Baas, the flood or northeastern stream commences 2¼ hours before and acquires its greatest strength, 3 knots, about the time of high water in the harbor, maintains it for about 2 hours, and ceases at 3¾ hours after high water. The Carnot Breakwater effectually shields the harbor entrance from the tidal streams, which are scarcely felt when within the line of that structure.

The harbor works have deflected the tidal streams and caused an eddy current to be set up at the entrance to the harbor. It is felt from the jetty heads to a distance of 500 yards outside them and from 1½ hours before to 1½ hours after high water. It runs across the entrance to the port from northeast to southwest until half an hour after high water, when it veers to the northwest and diminishes in strength. Its strength is 1 knot with northerly winds and ½ knot with southwesterly winds.

Tugs.—The services of tugs may always be obtained when required.

Pilots.—Eight pilots and three assistant pilots are stationed at Boulogne; they cruise in good decked cutters, well able to keep at sea in bad weather.

Lifeboats.—There are three lifeboats stationed at Boulogne; one is near the center of the northeast pier; the second, northward of that pier on the beach, near the baths; the third, southward of the harbor, at the end of the Chatillon sand hills.

Boulogne Road.—Good anchorage may be found for many vessels of about 20 feet draft under shelter of the breakwater, those of deeper draft than that should moor. There is also good anchorage in about 4¾ fathoms, 1,600 yards outside the pierheads, on a narrow strip of hard clay about 1,400 yards long, north and south, and 200 yards wide. This space is bounded on its western side by the rocky bottom known as l'huîtrière or the oyster bed, which begins at Cape Alprech and extends without interruption northward as far as the parallel of Ambleteuse. Deep-draft vessels may anchor farther out with Heurt Fort just open of Cape Alprech.

The best anchorage is in a position northward of the northern end of the Carnot Breakwater. Vessels of moderate draft may remain at this anchorage during fine weather, and with a long scope of chain out, even if caught there by a strong westerly wind; those of deep draft, however, would be in danger of touching bottom when tailing inshore at low water.

In fine weather vessels may also anchor well clear of the entrance channel in a depth of about 10 fathoms, good holding ground, at the eastern edge of the Bassure de Baas, abreast of Vimereux. If surprised here by strong northeasterly winds, they can make for Ambleteuse Road; or if a southwesterly gale should oblige them to seek refuge, they can run for the Downs or take shelter to leeward of the coast in the neighborhood of Calais.

Directions—Boulogne approach—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the later are exercising submerged, all vessels wishing to enter or leave the Port of Boulogne are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the north, by the alignment of Grande Armee column and Creche Point; on the south, by the alignment of Grande Armee column and the outer end of Carnot Breakwater; on the west, by a line parallel to the coast and distant 3 miles from it. The above limits have not been placed on the chart plates.

From the westward.—Sailing vessels approaching Boulogne from the westward, with the wind between south and west, should take the channel between the Bassure de Baas and the Vergoyer Bank, and if they arrive on the parallel of Mont St. Frieux at low water, and are of more than 15 feet draft, short tacks should be made in the channel between that parallel and the line of the Grande Armee column on with the lighthouse on the southwest pierhead. With the wind between south and east, the channel between the Bassure de Bass and the shore should be taken, and short boards made southward of the line of the column and lighthouse in one until the tide has risen sufficiently to enter the harbor, or weather permitting, they may anchor in Boulogne Road.

Vessels of the deepest draft may at all times cross over the Bassure de Baas in front of Boulogne. One of the deepest parts is with the Grande Armee column in line with the lighthouse on the southwest pier, seen over the breakwater bearing; but as the harbor is neared, the pierhead lighthouses should be opened of the breakwater; and the northeast pier red light slightly opened northward of the southwest pier occulting white (with red and green flashes) light at night, which line leads 200 yards northward of the breakwater end.

Caution.—Vessels of heavy draft and great length desiring to enter the port should not do so between 1¾ hours before and half an hour after high water.

It is unsafe to enter with a gale from between west through north to north by east, and particularly from west by north to northwest by north. In this latter case Calais is preferable.

In the northern approaches to Boulogne, from the head of the northern breakwater, as far as the parallel of Croi Fort, recent surveys by the French Government have revealed depths of about 1 fathom less than those shown on the charts.

From the Northward.—With the wind between north and west, vessels from the northward should pass westward of the Bassure de Baas, and, if the wind is fresh, they should wait outside this bank until the time for entering; but with a light wind the bank should be crossed on the parallel of Creche Point and a position maintained a short distance to windward of the entrance. If the wind is between north and east, it is better to take the channel between the Bassure de Baas and the land and then anchor, if the weather permits, in such a position as to have the wind a point or two free for running into port. The high land in the vicinity of Boulogne modifies the direction of the wind in the harbor, and sometimes when it is south by west outside it is south or southeast within. Strong winds from the northeastward come off in violent squalls from the high land northward of the harbor.

The best time for large vessels to enter is at 2¼ hours before high water at spring tides and 1¾ hours before high water at neap tides, when there is scarcely any stream. Sailing vessels should carry plenty of sail on entering the channel in order to stem the eddies which may be found between the pierheads, and, if the wind is offshore, a boat should be sent for the tracking rope. Generally speaking, when the wind is from west round by south to northeast, steer close to the southwest pierhead; with a fresh breeze from anywhere between northeast and west, keep in mid-channel; and in light winds procure a tug or steer for the southwest pier to take in the tracking rope.

Should a vessel miss the entrance during strong westerly winds and be unable to claw off the land, she should endeavor to pass close round the northern side of the northeast pier and run ashore under its lee. If this occurs at half or three-quarters of an hour after high water, there is some chance of getting her afloat again, and at all events the crew are safe.

Sailing vessels leaving the port for the northward should do so as soon as they are afloat, and with a favorable wind may make sail at once from their berths. Those bound westward, unless with a fresh, fair breeze outside to enable them to overrun the flood stream, should not quit the entrance channel until the latest moment or they may have to anchor outside to await the ebb stream.

The coast.—Creche Point, bearing 16° 1.3 miles from Boulogne southwest pierhead, is, as well as the intermediate coast, high and steep, and is at the western extreme of the range of hills separating the valley of the Liane from that watered by the River Vimille, on one of the highest points of which range stands the column of the Grande Armée, before described.

The coast continues steep for nearly a mile from Creche Point, but from thence to Vimereux it is bordered by high sand hills. About 1,600 yards 8° from Creche Point and 500 yards from the shore is the small semicircular fort of Croi, with two tiers of embrasures, built on rocks which uncover at low water, and rising 50 feet above the level of the beach.

From Vimereux to Oies Point, which bears 8° 2.1 miles from Creche Point, the coast is steep, but from thence to Audrecelles village, 2.3 miles farther northward, it is bordered by sand hills of middling height, covered with verdure. At 1.5 miles northward of Oies Point is the village of Ambleteuse, built on the northern side of the remains of its harbor, and, with the windwill on the high ground northward of the village, easily recognizable from the sea. Ambleteuse Fort, like that of Croi, had two tiers of guns.

From Ambleteuse to the village of Audrecelles, the shore consists of sand hills covered with bent grass and intersected by small rivulets, through which the sea runs in upon the land at high water. This village stands on the shore, and the church and windmills behind the village are conspicuous objects. From Audrecelles to Riden Point, about 2 miles farther northward, the land adjoining the shore gradually rises and forms a succession of hills separated from each other by valleys, of which some run down to the coast, but between Riden Point and Cape Gris Nez the land is more level and the cliff perpendicular, and, being nearly as high as Cape Alprech, may be seen 12 to 15 miles distant.

Between Ambleteuse and the rocks at Oies Point the beach is of sand and dries out 700 yards, but from Ambleteuse to Riden Point its breadth decreases and it consists of rocks covered with sand. The coast from Riden Point to Cape Gris Nez is bordered by a rocky shelf, of which the projecting points do not extend beyond 300 yards from the foot of the cliffs. Coasters, with offshore winds, should be cautious when approaching the shore between Croi Fort and Audrecelles, as a shoal bottom of uneven rock, with about 10 feet water, extends 1,000 or 1,200 yards from the coast.

Vimereux, formerly a harbor, is 1.3 miles northeastward of Creche Point, at the head of a small elbow in the shore between that and Oies Point. The harbor was formed at the commencement of the last century at the mouth of the River Vimille to accommodate vessels of the flotilla intended for the invasion of England; a freshet of that river having in after years broken down the sluice gates, the channel and piers were soon destroyed and the harbor filled up with sand and shingle. The waters of the river still follow their old channel, but the bottom has risen so much that at springs there is only a depth of 5 or 6 feet in what used to be the harbor; its destruction has caused the almost total desertion of the village, which is now nearly covered with sand.

Ambleteuse, a mile northward of Oies Point, is, like Vimereux, so far as its harbor is concerned, in a complete state of ruin; it is at the mouth of the little River Slack, and great improvements were made at the beginning of the last century with the same object as at Vimereux. The ruins of a stone jetty head and some piles in the northwestern part of the harbor still mark the outline of a basin in which the vessels of the flotilla were placed, but it is now filled with sand and mud and has only 4 feet water in it at springs. The village has some reputation as a watering place.

Lifeboat.—A lifeboat is stationed at Audrecelles, about a mile northward of Ambleteuse Fort.

Ambleteuse Road comprises the space between the Bassure de Baas and the coast, and extends from the parallel of Vimereux to that of Audrecelles. Vessels of deep draft bound to the northern ports of the Channel, or to Calais or Dunkerque, await spring tides in this road if they arrive during neaps with northerly winds, and are fairly sheltered during gales from northeastward round by east to south; the sea, however, is very heavy here when it blows strongly on a weather tide.

The best anchorage is between the parallel of Vimereux and the line of the church towers of Ambleteuse and Bazinghen in one, 67°, and a little inshore of the rocky ground forming the western limit of the anchorage of Boulogne, and which extends northward to the parallel of Ambleteuse. By not anchoring eastward of the small tower of Renard, a mile southeastward of Portel, in line with Boulogne Southwest Pier Lighthouse 171°, large vessels are in a good position to weigh should it blow strongly from the westward.

A good berth for a vessel of deep draft is 289° of Vimereux, with Renard Tower open 3° westward of Boulogne Southwest Pier Lighthouse, in a depth of about 8 fathoms hard, muddy clay, or in 9 fathoms good holding ground of muddy sand, with the lighthouse and Renard Tower in line and Bazinghen church tower open a little northward of Ambleteuse Fort, 67°. Large merchant vessels may anchor in 7 fathoms, hard sand and broken shells, on the latter bearing and with the column of the Grande Armée in line with Croi Fort.

Boulogne pilots call the space between the eastern edge of the Bassure de Baas and the rocky bottom which bounds the anchorage in Ambleteuse Road the Parfondingue; they state that ships of the deepest draft, requiring to remain some days in the road, should be placed in the Parfondingue between the lines of the column of the Grande Armee on with the southern slope of Creche Point, and Bazinghen Tower on with Ambleteuse Fort; here they have sufficient room to weigh and round Cape Gris Nez if it comes on to blow hard from the southwestward; or, if it shifts to west or northwestward, the crest of the bank shelters them from the heavy sea. To ride out a gale, they should be moored with open hawse to the westward and their anchors laid with a long scope of chain northeast and southwest in the direction of the tidal stream.

Tidal streams.—Abreast of Ambleteuse, at equinoctial springs, the greatest rate of the flood or north-going stream is from 3½ to 4 knots, and, in ordinary weather, this rate continues nearly 2½ hours; the stream follows nearly the direction of the channel and ends about 3¾ hours after the time of high water at Boulogne. The south-going stream is less rapid, continues longer, and ends 2½ hours before high water. The direction of the wind has great influence on both streams.

Cape Gris Nez is 8.5 miles northward of Boulogne; from it, Cape Alprech bears 185° 10.5 miles; Dungeness, 275° 23 miles; South Foreland, 333° 17.8 miles; and Beachy Head, 261° 52 miles. This cape, a precipitous sandstone cliff, 167 feet high, is one of the most remarkable headlands on the northern coast of France, and is visible 14 or 15 miles; from it the coast changes its direction abruptly eastward, and on both sides is of a dark gray color, taking a purple tint when lighted up by the sun. A lighthouse stands on the southwestern extreme of a small spot of level land crowning the cape; some works of defense may also be seen rising above the same land, and a guardhouse at its extreme near the crest of the cliff.

Ledge.—Large masses of rock lie at the foot of the cape, and a rocky shelf, partly covered with sand, dries at low water 500 yards out from the cliffs; the cape should therefore be given a berth of at least 800 yards.

Light.—Cape Griz Nez Lighthouse is circular, 85 feet high from base to vane, situated ¼ mile southward of the cape, and about 100 yards from the edge of the cliff; from it is exhibited, at an elevation of 233 feet above high water, an electric flashing white light, showing a lightning flash. It is visible 22 miles, and in ordinary weather the glare of the light can be seen as far off as 35 or 40 miles.

This light should not be mistaken for the light at Calais, which is also electric, nor for the flashing light at Cape Alprech.

Fog signal.—During thick or foggy weather a siren is worked by compressed air.

Semaphore.—There is a semaphore station close to the lighthouse.

Lloyd's signals.—A Lloyd's signal station is established at Cape Gris Nez.

Pas de Calais.—The narrowest part of this channel is 8.8 miles wide, between the Ridge or Colbart Shoal and Cape Gris Nez; from thence it runs nearly parallel with the coast as far as Boulogne, and then in a 227° direction between the Bassurelle and Vergoyer Shoals. With easterly winds, it is to be preferred to the Dover Channel between the Varne and the English Shore; it is both wider and deeper, and is a continuation of the deep-soundings channel of the North Sea, in which the depth is above 20 fathoms. It is easily navigated by the lead either with a leading or beating wind, and even during fog or snow, the only danger being the northern end of the ridge which rises abruptly from a depth of 20 fathoms.

To avoid the northern end of the ridge a vessel turning to windward in the Pas de Calais, either by day or night, when northward of the parallel of Cape Gris Nez and standing westward should not bring the South Foreland Lighthouses eastward of 354°; and when southward of that parallel she should not go into a less depth than 20 fathoms. A bearing of the Varne Light Vessel is also very useful for avoiding this shoal.

Tides and tidal streams.—It is high water, full and change, on the beach a little eastward of Cape Gris Nez at 11h. 27m.; extraordinary springs rise 27 feet, ordinary springs 21½ feet, neaps 16¾ feet above the level of the lowest tides; at Dungess, at 10h. 45m., springs rise 21¾ feet, neaps 19 feet; and at the Varne and Ridge Shoals at 10h. 40m. Within a circuit of 2 miles round the cape, the streams run stronger than at a greater distance from the shore; the flood or northeastern stream beginning 2 hours before and ending 3¾ hours after high water at Boulogne, and running 4 knots when at its greatest strength at springs. Between the Ridge and the French Shore the northeastern stream runs with much greater strength than the southwestern.

The tidal streams on the French Coast, in the northern inshore part of the English Channel, are nearly of the same duration as in the Bay of Seine, the northeastern stream running about 5½ hours and the southwestern stream 6½ hours. Toward the middle of the channel the streams run straight throughout its length until they have attained their greatest strength, when they follow the bends of the coast to a distance of 7 miles in the offing. Inshore of these limits, as soon as the northeastern stream begins to be felt, it turns toward the shore, but as its strength increases it tends more to its principal direction, viz: That which it follows when at its greatest strength and retains for the greatest length of time; when its rate begins to decrease it turns offshore and takes different directions until the end of the tide. The southwestern stream runs with less velocity and undergoes the same changes, but with this difference, that it varies much more in direction.

At the Varne and Ridge Shoals the tide rises for 4½ hours before the northeastern stream commences and falls for 4¾ hours before the southwestern stream begins, making 6½ hours of northeastern and 5½ hours of southwestern stream. Strong southwesterly gales prolong the northeastern stream nearly an hour and retard proportionally the southwestern stream, so that on some occasions, on the Ridge especially, 8 hours northeastern and only 4 hours southwestern streams have been found. The rate of both streams increases in proportion to the narrowing of the channel. Between the Vergoyer and the shore both streams make about an hour sooner than farther in the offing.

Caution.—The deep bight in the coast between Capes d'Antifer and Gris Nez constrains the flood stream to change its direction about the meridian of Point d'Ailly and to turn 64° obliquely toward the coast between the River Somme and Cape Gris Nez; but, with strong westerly winds, it runs much farther eastward and turns suddenly only a short distance from the shore, causing a high sea. Vessels from the westward bound to ports in the northern part of the channel, and running with a strong westerly wind, can not be too attentive to the effects of this stream; as soon as they have sighted either Cape Barfleur Light or that on St. Catherine Point they should act with great caution to avoid being set over on the French coast, and should sound frequently after passing the meridian of Cape d'Antifer, for, if they take the ground on any of the banks off the Somme or on the low coast in its vicinity, it will in all probability involve the loss of vessel and crew.

Table showing the direction and rate of the tidal streams at certain times of tide during ordinary springs, from Cape d'Antifer to Cape Gris Nez.

Positions and tidal stream.	Time, with reference to high water at Dieppe.[1]	Direction.	Rate.	Duration at the rate given.
323° 7 miles from Cape d'Antifer:	h. m.		Knots.	h. m.
Flood	2 20 before	N. E. by E	4.0	
End of flood	0 40 after			
Ebb	4 0 after	W	3.5	
End of ebb	5 0 before			
14° 34.5 miles from Cape d'Antifer:				
Flood	2 20 before	E	3.5	2 0
End of flood	1 0 after			
Ebb	4 0 after	W. ½ S	3.2	2 30
End of ebb	5 20 before			
45° 18 miles from Cape d'Antifer:				
Flood	1 5 before	E. ½ S	4.0	
End of flood	1 45 after			
Ebb	4 30 after	W. by S	3.5	
End of ebb	5 0 before			
289° 2.5 miles from Dieppe:				
Flood	2 40 before	E	3.0	3 0
End of flood	1 5 after			
Ebb	4 0 after	W	2.9	
End of ebb	4 50 before			
323° 1.8 miles from Treport:				
Flood	2 20 before	E. ½ N	3.0	2 45
End of flood	1 20 after			
Ebb	5 40 after	W	2.8	
End of ebb	4 20 before			
264° 16.5 miles from Haut Banc Point, on the southwest end of the Bassure de Baas:				
Flood	2 40 before	E	2.0	
Do	0 40 before	E. N. E	3.0	
Do	1 20 after	N. N. E	1.6	
End of flood	2 20 after	N. by W	.5	
Ebb	6 0 after	S. W	2.0	
Do	4 40 before	S. W. by S, ½ S	2.7	
End of ebb	3 0 before			
284° 5 miles from Haut Banc Point:				
Flood	1 40 before	N. E. by E	1.6	
Do	0 30 after	N. N. E	3.5	2 0
End of flood	3 20 after			
Ebb	5 10 before	S. W	3.0	
Do	4 0 before	S. W. by S	2.4	
End of ebb	2 40 before			
On the Bassurelle Bank:				
Flood	2 20 before	N. N. E	1.5	
Do	0 30 before	N. E. by E	3.5	
Do	2 30 after	E. N. E	2.0	
End of flood	4 0 after			
Ebb	4 45 before	S	3.0	
Do	4 10 before	S. W. by W	3.0	
End of ebb	2 45 before			
289° 2¾ miles from the entrance to Boulogne:				
Flood	1 10 after	N. N. E	3.0	2 0
End of flood	4 10 after			
Ebb	4 40 before	S. S. W	2.6	
End of ebb	2 0 before			
On the south end of the Ridge Shoal:				
Flood	0 10 before	N. E	2.5	
Do	1 0 after	N. E	3.8	
End of flood				
Ebb	5 10 before	S. W by W	3.5	
End of ebb	2 0 before			

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[1] High water at Dieppe is simultaneous with that of Dover.

CHAPTER XII.

CAPE GRIS NEZ TO DUNKERQUE.

The coast from Cape Gris Nez trends easterly for 6 miles to Cape Blanc Nez; the intermediate land is high and may be seen in clear weather from a distance of 15 to 20 miles; but, beyond the latter cape, the shore bends more eastward, the high land turns in a southeasterly direction toward the interior, and a level plain extends from its foot to the coast, where it terminates in a low sandy shore bordered by ranges of sandhills, of which the highest are visible only from 7 to 10 miles. Between the capes the shore forms a slight bay, at the head of which is the village of Wissant, inhabited by fishermen; at 2 miles inland from Wissant is Mont Couple, 525 feet in height. From about a mile eastward of Cape Gris Nez, where the sandstone cliffs of that cape terminate, to 1.5 miles northeastward of Wissant, where steep chalk cliffs recommence, the coast is low and bordered by sand hills.

Cape Blanc Nez owes its name to the high chalk cliff in which it terminates. It forms no marked projection, but its position may be recognized from a good distance at sea by the guardhouse on the summit of the steep mound which crowns it, and which is the northern extreme of a range of hills joining Mont Couple. The last slopes of the high land forming the cape, as well as the steep coast in which they terminate, extend 1.5 miles eastward, nearly as far as the village of Sangatte, and at this village commences the low sandy shore, which is the distinguishing feature of the remaining part of the French and of the Belgian coasts. The sandhills are low to within 1.5 miles of Sangatte, but they gradually rise in height as they near Calais, spreading into parallel ranges which approach within 400 or 600 yards of the shore.

Aspect.—The principal objects on this coast are a beacon on a hill, about 1,200 yards inshore of Cape Blanc Nez, the windmill of Coquelles about 2 miles inland on the last slopes of the range of hills extending eastward of Cape Blanc Nez; the windmill at Nieulay, northward of this; the red buildings at Trouie or the Salines, about halfway between Sangatte and Calais, and about 8° from Coquelles windmill, which are useful marks to the pilots, who call them les maisons rouges. Also, the ramparts and citadel of Calais, with the spire of its cathedral as well as that of the Church of St. Pierre les Calais farther to the south, which rises above the sandhills and may be seen some distance at sea.

The strand in front of Sangatte is only 500 yards wide at low water, but near the west pier at Calais it dries out ½ mile. At 400 or 600 yards outside it are several shoal patches of 7 or 8 feet, and no vessel should get among them.

Beacons.—Two lines of beacons, marking an area where the cables land, and in which anchorage is prohibited, have been established at Sangatte:

(*a*) The eastern line is formed by two beacons, painted in white and blue horizontal stripes. The front beacon, having a triangular white topmark, is situated near the beach. The rear beacon, having a circular white topmark, is situated about 120 yards 153° from the front beacon.

(*b*) The western line is formed by the square bell turret of Sangatte Church, and a similar beacon, with a rectangular white topmark, situated about 90 yards 297° from the bell turret.

Blanc a la Ligne, of sand and broken shells extends 2.5 miles 47° from Cape Gris Nez and 1.8 miles from the shore abreast Wissant. Its shoalest part uncovers from 4 to 6 feet at low water springs.

La Barriere is the continuation northeastward of La Ligne Bank for 1.8 miles; near its extreme at 1.5 miles offshore the depth is but 3 feet in places, with outlying patches; the sea runs high upon them when a fresh breeze opposes the tide.

Buoy.—A red buoy surmounted by a triangle marks the northwest side of La Barriere Sand, 1,350 yards 278° from the 3-foot patch.

Les Gardes Rocks.—The shore between Capes Gris Nez and Blanc Nez is bordered by a sandy strand, uncovering in some places 800 yards seaward at low water. In front of all the steep parts of the coast flat rocks rise above the sand, the most outlying of which, nearly ½ mile from the shore, is named Les Gardes; it dries 7 feet at low water, and lies with the guardhouse on Cape Blanc Nez, bearing 64° distant nearly 1.5 miles.

Les Quenocs and Le Rouge Riden, two ridges of rock and sand, front the coast between Cape Blanc Nez and Sangatte village.

Quenocs, the outermost, about ½ mile in diameter, has a least depth of 1½ fathoms; from its center the guardhouse on Cape Blanc Nez bears 146° distant about 1.5 miles.

Le Rouge Riden is nearer the shore and nearly a mile in extent. From its shoalest head of 1 fathom near the western end the guardhouse on Cape Blanc Nez bears 160° 1 mile. There are other heads nearer the shore. The sea runs high on both shoals when a strong wind opposes the tide.

Sangatte Church in line with the windmill at Coquelles, bearing 118°, leads northward of these dangers.

Bell buoy.—A red bell buoy, No. 4, with reflector, in a depth of about 4 fathoms, marks the north side of Les Quenocs, with Calais West Pierhead bearing 78°, distant nearly 6 miles.

Riden de Calais.—This bank is about 4 miles in length 53° and 233° and fronts Calais Harbor at a distance from it of 2.5 miles. Its general depth varies from 5 to 8 fathoms, but patches of 4¼ to 4¾ fathoms exist near the center. From the southwestern shoal head of 4¼ fathoms the entrance to Calais Harbor bears 107°, distant 2.8 miles. The bank is dangerous at low water for vessels of deep draft only, but it occasions strong eddies, and during fresh winds from the northward there is a heavy sea on it and breakers in northeast gales.

Buoys.—A black buoy, No. 1, with staff and St. Andrew's cross top mark, is moored in 6½ fathoms water in the deep between the Riden de Calais and the Quenocs, with Calais West Pierhead bearing 93° 3.3 miles.

A red buoy No. 6, with perch and globe, lies in 10 fathoms about a mile east of the shoal heads of the Riden de Calais, with Calais Pierheads bearing 157° 2.3 miles.

Detached shoal.—The Riden de Calais has extended toward the southward and southeastward, the depths being as follows: 2¾ fathoms at a distance of 2.3 miles 24° from Sangatte Church, 4½ fathoms at a distance of 2.3 miles 33° from Sangatte Church. These soundings have been shown on the charts as a detached shoal, and a note, "Less water reported (1911)," inserted between them and the Ridens de la Rade, the depths being from 5½ to 7 fathoms.

Buoy.—No. 1 black buoy lies ½ mile to the westward of the above detached shoal.

Ridens de la Rade lie about midway between the Riden de Calais and the shore, on the east side of the approach to Calais Harbor. They consist of several ridges of sand, the least depth upon which is 6 feet, distant 1.8 miles 8° from Calais Light; the western patch of 10 feet lies at a distance of 1,7 miles 340° from Calais Light, and from this position the 3-fathoms curve extends 800 yards in a 246° direction and the 5-fathoms curve 1,500 yards. For 1,000 yards beyond this to the westward the depths are under 5½ fathoms. There are other patches of from 7 to 12 feet between these two. A heavy sea runs on this bank with onshore winds.

Buoy.—A light buoy, exhibiting a fixed red light, painted black, and marked No. 3, is moored on the west-southwestern extremity of the bank.

Rade de Calais, comprised between the Riden de Calais and the sandy shore westward of Calais Harbor, affords anchorage with offshore winds to vessels arriving off the harbor a few hours before the tide permits them to enter. A convenient position in a depth of about 9 fathoms and 1 mile from the shore is, with Sangatte Church in line with the guardhouse on Cape Blanc Nez bearing 233° and Calais Lighthouse 115°. At night keep Cape Gris Nez Light opening and shutting with the cliffs at Cape Blanc Nez, and anchor when Calais Light bears 115°.

The road has depths of from 10 to 14 fathoms toward the Riden de Calais and 7 to 9 fathoms at ½ mile from low-water mark to the westward 600 yards, the bottom being sand mixed with broken shells, but according to the pilots the anchors penetrate into a good holding ground beneath the sand, and ships of deep draft have ridden out northwesterly gales without driving, when anchored under the southern part of the Riden de Calais. The holding ground is not so good near the shore.

Signal station.—There is a signal station on the shore about 1,200 yards westward of Calais West Pier.

Calais.—The most conspicuous landmark of Calais is the Hotel de Ville; it has a square tower, the spire of which is inclosed by four minor spires. This port is entirely artificial and consists of an entrance channel, outer port, import dock, and the small Bassin du Petit Paradis, all of which are tidal, but well sheltered from the wind and sea; though when it blows strongly from the northward all the tidal portion of the port is more or less affected by the swell. Also of a wet dock under the ramparts of the citadel, opening from the import dock; the Bassin Carnot, entered from the southeastern end of the outer port, with a dry dock at its head; and at its southwestern corner an inner basin communicating with a basin for small craft, which latter communicates also with the western wet dock and import dock, and with the general canal system of the country.

The quays are all connected by rail with the central railway station, and thus with all parts of Europe; they are well equipped with hydraulic cranes and all the most modern appliances for the speedy discharging and loading of vessels, and with extensive sheds and bonding stores. The entrance of the port is 11.5 miles eastward of Cape Gris Nez and 114° 21.5 miles from Dover Pierhead.

Calais owes its importance to its geographical position, which makes it the most convenient port for passengers and mails between the Continent and the United Kingdom, when time is the all-important object. The harbor has undergone great improvements both in depth and general accommodation of late years, including vast works, completed in 1896, for widening the entrance, as also constant dredging to maintain the depth gained. It is not only connected direct with Paris by rail, but also both by rail and canal with Gravelines, Dunkerque, and all the industrial region of Belgium and the north of France.

Mariners should also remember that when it blows strongly from between west and south, and the approach to Boulogne is hazardous for sailing vessels, Calais can be entered with comparative ease; and, on the contrary, when it blows hard from the northeastward, and it is impossible to enter Calais, Boulogne can be entered with safety.

Population—Trade.—Calais had, in 1911, a population of 72,322; it has considerable foreign and a brisk coasting trade; the vessels belonging to the port are chiefly employed in the cod, herring, and mackerel fisheries. The principal imports are coal, iron, machinery, wood, jute, petroleum, woolens, cottons, etc.; the exports, sugar, metal ware, glass and porcelain, eggs, silks, Parisian goods, etc. In 1913 the yearly output of coal was approximately 30,000,000 tons, while nearly 2,000,000 tons of patent fuel, both in brick shape and in small oval balls, were produced.

Mail steamers cross the channel between Dover and Calais three times each way daily, the distance being accomplished under ordinary circumstances in about 1¼ hours.

Cargo steamers between Calais and London, direct, run twice a week; between Calais and Leith, direct, is a weekly service.

The United States is represented by a consul and vice and deputy consul.

Entrance channel.—Great improvements have been made in this channel by the construction of the new east pier, the channel being now 430 feet wide between the pierheads, and still wider within; it runs about 900 yards in a 143° direction from the pierheads to the outer port. About 800 feet of the outer part of both piers consist of open pile work, intended to prevent the accumulation of sand. Through this open work, as well as across the entrance, both flood and ebb streams sweep with great strength and at right angles to the direction of the channel, causing serious inconvenience and requiring much skill in the handling of vessels entering or leaving at or near high water, at which time the northeastern stream is running at its greatest strength. The west pier has a small opening, about 250 yards from the end, to enable boats to load with sand from that side. At its inner end it terminates in the towing path passing under the glacis of Fort Risban.

The new west pier was commenced in 1913. It is to be built outside the present wooden pier, which will ultimately be demolished; its base will be 26 feet below the zero of the chart, and this will allow for dredging to 18 feet below the lowest tide at low water, neaps. A large breakwater will close the expansion of the channel westward.

Depths—Caution.—A depth of from 15 to 18 feet is now maintained in the channel at lowest tides known; this gives a depth of 41 feet at high water, springs, of 3½ feet less at high water, neaps, and 30 feet at half tide.

It must, however, be borne in mind that from the exposed condition of Calais Harbor unusual difficulties lie in the way of maintaining an equable and thoroughly reliable depth in the entrance channel, for during a continuance of heavy weather the movement of the sand along the coast has always a tendency to the formation of a bar across and in the channel, and although, on the one hand, great improvements in depth have been made and fairly maintained, it must not be forgotten, on the other hand, that temporary shoaling may take place, against which possibility the mariner should be on his guard.

The outer port is tidal and begins where the east pier joins the wall of the quay opposite Fort Risban. This quay is 600 yards in length and its space is wholly occupied by the railway station. There is a depth of 15 feet alongside this quay at low water, springs, the central depths of the outer port leading up to the lock entrances to the Bassin Carnot being from 18 to 25 feet, and its width 186 yards. The south quay of the outer port is 273 yards long, with depths of from 14 to 18 feet alongside at low water, springs.

The outer port.—The north quay is divided into four berths, starting from the southeastern end. In No. 2 berth, which is exactly opposite the center of the railway station, the least depth of water is 16 feet at low water, ordinary springs, and in No. 4 berth, which extends from the northwest angle of the quay for a distance of 300 feet, the depth is 14½ feet.

Mooring buoys.—There are two mooring buoys in the center of the outer port, used for securing steamers when waiting for the lock gates to be opened. These buoys will be removed if required for vessel to turn on three days' notice being given to the consul.

The Bassin Carnot is opened 2½ hours before high water and closed 2 hours after high-water slack. It is entered from the outer port by two locks, one 436 feet, the other 451 feet long; the first is 68 feet wide in the entrance, the other 46 feet; both have 28¾ feet over the sill at high water, springs. The mean length of the Bassin Carnot is 873 yards, its width 162 to 218 yards, its area 23 acres, and its bottom is 20 inches below the level of the lock sills. On its side is a 40-ton hydraulic crane, besides, as before mentioned, railways and every convenience for loading and discharging cargo, storage, etc., on all its spacious quays.

Dry dock.—At the head of the Bassin Carnot is the dry dock, 500 feet in length over all, width of entrance 68¾ feet at water level, 64¾ feet at sill, and depth of 28¾ feet over sill at high water, springs. This dock can receive a vessel 498 feet in length. Space has been reserved for the construction of two additional docks.

Inner basin and canal dock.—At the southwestern corner of the Bassin Carnot is the inner basin, a space about 200 yards long and 66 yards wide, from which the canal dock or basin for small craft is entered by means of two locks 236½ feet long, with entrances 19¾ feet wide. The canal dock also communicates with the Bassin de l'Ouest by means of a lock 230 feet in length by 17 feet in width. The canal dock has an area of 10 acres and from it the largest sized canal boats of 400 tons can proceed by the inland waterways of the north of France and between Belgium and Paris.

Import dock.—Reverting to the outer port; on its southwestern side is the wide opening into the import dock, also tidal, as well as the Bassin du Petit Paradis on its southern side. This dock dries at low water and has a depth of 20½ feet at high-water springs. It has, including the Bassin du Petit Paradis, 1,800 yards of quayage, with all facilities for loading and unloading, and excellent grounding berths. A small careening gridiron is established at the western end of this dock.

Considerable works and demolition are being carried out on the northern side of this basin, with the object of improving the water area of the outer port. The works are marked by green lights and beacons.

Bassin de l'Ouest.—The western wet dock has its entrance at the head of the import dock; it is opened 2 hours before high water and closed 1¼ hours after high-water slack. The entrance between the gates is 55¾ feet wide and the sill has a depth of 20½ feet over it at high-water springs. Its length is 437 yards, width 70 yards, inclosing an area of 5½ acres. It communicates with the canal dock as previously described and has the same conveniences for loading and discharging as the other docks and basins.

The southeast quay of this basin is now (1913) being reconstructed and will be ready for use in 1915; it will allow vessels drawing 23 feet of water mooring and lying at all tides.

Lights.—**Calais Lighthouse,** an octagonal brick tower 167 feet high, stands at the northeastern side of the town; from it is exhibited, at an elevation of 190 feet above high water, an electric, group-flashing, white light, visible 20 miles.

West Pier.—A fixed green light, unwatched, elevated 36 feet above high water, and visible from a distance of 4 miles, is exhibited from a metal turret 27 feet high, painted white, at the outer end of the West Pier.

East Pier.—From a metal tower 20 feet high, painted white, on the East Pierhead, at an elevation of 31 feet above high-water, is a tidal light visible 9 miles. The light is fixed white, varied by groups of red and green flashes, to indicate the height of the tide above the level of the soundings on the chart or standard low water.

Caution.—When unforeseen circumstances make the entrance to the harbor dangerous, the night tide signals will be replaced by the harbor signals shown from the East Pierhead in accordance with the regulations forbidding entrance or directing the movement of vessels.

Fog signals.—At the extremity of the East Pier, a fog signal consisting of a trumpet, is worked by compressed air. If disabled, a hand horn is worked in a similar manner at the East Pierhead if the port is accessible; and, in addition, when a mail steamer is due, a gun is fired from the same pierhead.

Submarine fog bell.—A submarine fog bell has been established at the head of East Pier.

Harbor signals.—The following signals, relative to entrance into or departure from the harbor, are made by day and by night, respectively, at Calais:

Day signal.	Indication.
Red flag at East and West Pierheads and at harbor master's office.	All movements in channel suspended through obstacle or dredger (showing three black balls).
Red flag at East and West Pierheads and at harbor master's office half mast; dredger showing green pendant over green flag in addition to three black balls.	Regular, mail, or other steamers and craft under 50 tons burden may pass dredger at own risk for all damages done.
Red flag with green border at East Pier and at harbor master's office.	All movements in the harbor prohibited for the entry of a large vessel.
Green burgee at East Pier and at dock master's office on Quai de Maree.	All movement suspended for the departure of a vessel.
A white flag with blue border at harbor master's office.	One or both dock gates are open.
A white flag with blue border at lookout on East Pier.	Bassin Carnot is open.
A white flag with blue border near entrance to western sluicing basin.	Bassin de l'Ouest is open.

Night signal.	Indication.
A red light at harbor master's office and two red lights, vertical, on the East Pierhead.	All movement in channel suspended, through obstacle or dredger (showing three black balls).
Red light over green light at southern end of Quai de Maree.	All traffic suspended for the entry of a vessel.
Two green lights, placed vertically, from southern end of Quai de Maree.	All traffic suspended for the departure of a vessel.
Two green lights, one on each side of any dock entrance.	Lock is open.
In addition a green light near lock house adjacent to old flushing sluices.	Bassin de l'Ouest is open.

Pilots.—A number of pilots are stationed at Calais; they cruise in two small schooners, the one as far westward as Dungeness, the other as far northward as the Galloper Light Vessel. The first pilot met with should be taken, as the pilotage fee does not increase for any distance beyond 10 miles from the port. When pilots are not able to get to sea, they indicate to approaching vessels the course to be steered by means of a mast working on a hinge at the East Pierhead; this mast is inclined in the direction of the side toward which the vessel should steer.

Coal, supplies, etc.—A large quantity of coal at reasonable prices is always in store, and there is every facility for vessels of deep draft to coal afloat, either in the wet docks or alongside the South Quay of the outer port. Depth alongside wharf in tidal basin, 16 feet; alongside quay of inner wet dock, 24 feet. Supplies of all sorts are plentiful and good. Repairs can be executed with dispatch.

Tugs.—Several tugs are attached to the port.

Lifeboats.—In case of shipwreck, there is a rocket apparatus at three distinct stations at Calais, and also two lifeboats; one of the latter is stationed on the eastern side, the other on the western side of the harbor.

Tides.—It is high water, full and change, in Calais Harbor at 11h. 49m.; springs rise 22½ feet and neaps 19 feet above the soundings shown on the chart, which zero is about 1½ feet below the level of low water, ordinary springs. With westerly gales, the tide rises a foot or two higher than in fine, settled weather. High-water slack lasts, at springs, for about 20 minutes; at neaps, for as much as 45 minutes.

Tidal streams.—The mean duration of the flood or east-going stream, at springs, in front of the entrance is 5½ hours, and of the west-going stream 7¼ hours. At half a mile outside the piers the eastern stream runs for 2½ or 3 hours after high water in the harbor, and, with strong westerly winds, for 4½ or 5 hours after; with easterly winds it continues only 1½ or 2 hours after high water in the harbor. The rate of the flood at extraordinary springs is 4½ knots.

Directions—Calais approach—Fairway reserved for traffic when submarine vessels are exercising.—A submarine flotilla is stationed at Calais. When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels, to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the port of Calais are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway is limited as follows: On the north, by the alignment of the Hemmes de Marck and Walde Lighthouse. (This line passes through the position of buoy No. 6.) On the south, by the alignment of St. Pierre-les-Calais spire and the semaphore westward of Fort Risban; on the west, by a line joining buoy No. 6 to buoy No. 1. The above limits have not been placed on the chart plates.

There is no great difficulty in steamers making and entering Calais Harbor in fine weather, by day or by night, provided there is sufficient depth of water, but the set of the stream across the entrance is to be guarded against. The best time for long steamers to enter at springs, provided there is sufficient water in the channel, is either about 2 hours before or 2 hours after high water, as then the stream is nearly slack, whereas at high water it runs eastward at the rate of 3½ to 4 knots. This does not apply to neap tides, as the stream at high water only runs at the rate of about 1 knot. The same remarks apply to sailing vessels with a fair wind, but they should be careful to hug the west pier on the flood. With a head wind they are required to have the services of a tug. The following directions for approaching are more applicable to sailing vessels.

Moderate onshore winds only cause a heavy swell on the shores of the approaches to Calais, but when strong they send in a heavy sea, and it is then dangerous to enter the harbor. Under these circumstances, which are frequent in winter, vessels bound for the northern ports of France should immediately make for the outer harbor of Boulogne, which affords shelter from westerly winds. During easterly winds, Ambleteuse Road, northward of Boulogne, affords shelter.

On account of the alterations in the Ridens de la Rade, vessels entering Calais are recommended to keep Calais Light to the westward of the East Jetty Light until Walde Light bears north or east.

It should be borne in mind that at all French ports of any importance a red flag is shown at the tide signal staff when the port is rendered inaccessible by bad weather.

From the westward.—As a general rule all vessels should sight Cape Gris Nez Light when bound either to Calais, Gravelines, or Dunkerque.

Vessels making for Calais from the southwest, when eastward of Cape Gris Nez, should take care not to bring the extreme of that cape westward of 214° in order to keep outside the Barriere and Quenocs Rocks. When Sangatte Church is in line with Coquelles windmill, 118°, the vessel will be eastward of those dangers and may shape course toward Calais Lighthouse, passing southward of No. 1 buoy and into Calais Road, waiting there for tide if necessary.

Small craft may pass at all times of tide between the Quenocs and the Barriere, by keeping Sangatte Church on with either of the three towers of Calais; they may also pass between the Rouge-Riden and the shore, from half flood to half ebb.

At night, Cape Gris Nez light should not be brought westward of 214°, to avoid the Barriere and the Quenocs, until Calais Light bears 93°; when a course 82°, allowing for tide, will lead near No. 1 buoy and into the road. Anchor before Cape Gris Nez Light is hidden behind the cliff at Cape Blanc Nez, if there is not sufficient water to enter the harbor.

From the northward.—Between one-third flood and two-thirds ebb in Calais Harbor, either by day or night, vessels from the northward in fine weather may run directly for the entrance over the Riden de Calais, where there is then sufficient water. At other times they should be guided by the buoyage of that bank making every allowance for the tidal stream which at times amounts to 4 knots.

At night, approach Calais Light on a 99° bearing until Cape Gris Nez Light bears 228°, then steer about east, for the anchorage, but do not shut in Cape Gris Nez Light behind Cape Blanc Nez unless about to enter the harbor.

Banks off the North Coast of France and Belgium—General remarks.—The approach to the low and dangerous coast between Calais and the River Schelde is obstructed by numerous banks of gray and black sand, which extend 15 miles from the shore on the meridian of Calais, and 42 miles in a northeasterly direction from Dunkerque. They are all long and narrow, and converge in direction toward Dover Straits. Their shoalest parts may be touched upon by vessels of almost any draft, and the eddies they occasion cause a hollow sea which breaks when it blows hard. Those farthest from the land lie on the eastern side of the 20-fathom curve of soundings, which, in the southern part of the North Sea, is the eastern limit of the fairway to Dover Strait.

The banks are all steep-to on their inshore or southeastern edge and extend with a gentle slope toward the northwest, and, as they rise from a bottom of sand, gravel, and broken shells, on which there is everywhere a less depth than 20 fathoms, the simple precaution of not going into less than 20 fathoms insures keeping outside all these banks. The lights at Cape Gris Nez and Calais are in a good position to point out at night their western limit; the main light at Dunkerque, in clear weather, gives notice of approach to the greater part of them, and the navigation is still further facilitated by the two light vessels moored within the Hinder Banks, by that northeastward of the Ruytingen, and by others more inshore. The dangers of the inshore navigation can only be avoided by placing the vessel in charge of a pilot, for the banks are all so liable to changes in their formation that no description of them can be considered permanently reliable; generally speaking, none of the banks should be approached except a vessel is bound for one of the harbors on the coast.

The rise of tide over the outermost of these banks may not exceed a few feet.

The banks are divided into two groups, those nearest the shore, 11 in number, being named the Dunkerque Banks; others, 6 in number, lying some distance from the coast and northward of the Dunkerque Banks, were but little known until surveyed between 1831–1840; they are the Fairy, North Hinder, West Hinder, East Hinder, and Bligh Banks, and Thornton Ridge.

Dunkerque Banks, 11 in number, extend 15 miles from the coast between the meridians of Calais and the frontier of Belgium, and will now be described.

Caution.—The buoys marking these outer banks are very liable to drift from their charted position during gales, but they are replaced as soon as possible.

Sandettie is the outer and westernmost of the Dunkerque banks; it is 12.5 miles in length in a 56° and 236° direction, its breadth varying from 800 yards to a mile. Its southern and southeastern edges are steep to, but its slope is more gradual toward the northwest, and this side may be easily avoided by the lead.

There are two ridges on this bank over which it is dangerous to pass in bad weather. The western ridge has a patch of 3¼ fathoms, with Calais Lighthouse bearing 188°, distant 15.3 miles. The center of the eastern ridge, with 3½ fathoms, lies 3.5 miles 65° from the western patch. On other parts of the bank the depth vary from 5 to 9 fathoms.

The Sandettie, rising suddenly from comparatively deep water, causes strong ripplings, and, with a fresh breeze, the sea is heavy around it and breaks on the ridges.

From the southwestern end of the bank, which is steep-to, Cape Gris Nez, Calais, Dunkerque, and other lights are visible in clear weather.

In the daytime, in clear weather, the summit of Mont Couple to the southward, the South Foreland, and the white cliffs near Dover may be recognized.

Light.—About ½ mile northwest of the western shallow ridge of the Sandettie Bank a light vessel is moored in a depth of 12 fathoms, and exhibits a flashing white light at an elevation of 39 feet above the sea, visible 11 miles. This light vessel has a military mast in the center (bearing the light), is painted red, and marked SANDETTIÉ on each side.

An anchor light is shown from the fore part of the light vessel to point out the direction of the stream.

Fog signal.—During thick or foggy weather, a fog siren is sounded.

Submarine fog bell.—During thick or foggy weather, a submarine fog bell will be sounded on board the Sandettie Bank Light Vessel.

Caution.—As vessels have often come into collision with this light vessel by endeavoring to pass ahead of her, mariners are cautioned to pass astern and not ahead of this light vessel, for the tidal stream runs at a rate of 2½ to 3 knots past her at springs.

Outer Ruytingen, midway between the coast of France and the Sandettie, is separated from the latter by a channel from 5 to 6 miles wide with depths of 15 to 20 fathoms. Its western end is about 7 miles from the shore on the meridian of Calais Lighthouse; from thence, within a depth of 10 fathoms, it extends about 19 miles east-northeastward about a mile beyond the position of the light vessel.

The bank rises steeply from the bottom on its southeastern side, but with a gentle slope northwestward. Those parts on which there is a less depth than 5 fathoms form two ridges, with a channel of from 6 to 8 fathoms and 2 miles wide between them; from the center of this channel Gravelines Lighthouse bears 141° and Calais Lighthouse 205°. Vessels that can enter either Gravelines or Calais may pass over the flat between these ridges at any time of tide between Nos. 2 and 4 buoys on the western side, and No. 7 buoy on the eastern side.

The western ridge has a least depth of 1¾ fathoms, and within the depth of 5 fathoms is 3½ miles in length.

The eastern ridge within the 5-fathoms line is 9 miles in length, with depths of from 2 to 3 fathoms in places.

The bank causes strong tide rips, and with a fresh breeze the sea breaks on the shoalest parts and is heavy on its edges. There are irregularities of bottom extending westward of this bank, and those in small vessels should avoid crossing them in bad weather on account of the high sea they occasion.

Shoal reported northward of.—The cable steamer *Faraday*, when drawing 20 feet of water, grounded in a position with Dunkerque Leugenaer Lighthouse bearing 126°, distant 13.2 miles, and Calais Lighthouse 217°. This position is 1 mile northward of the 5-fathoms curve, off about the center of the eastern ridge, and a depth of 3 fathoms has been placed in it on the charts.

Buoys.—Three buoys mark the northwestern side of the eastern ridge of the Outer Ruytingen Bank, viz:

Northeast buoy, No. 1, is a black spar buoy surmounted by a cylindrical topmark, moored in a depth of 10 fathoms, at ½ mile 278° of the north end of the ridge, with Dunkerque Lighthouse bearing 141°, distant 12 miles.

Middle buoy, No. 3, black conical with staff and cylinder, in 6 fathoms, 4 miles 222° from the northeast buoy.

Southwest buoy, No. 5, black spindle with cylindrical topmark, in 8 fathoms, ½ mile northward of the western end of the eastern ridge, 242° 4 miles from the middle buoy.

Three buoys also mark the western ridge of the Outer Ruytingen (Little) Bank, viz:

North buoy, No. 2, is a red spindle buoy, with staff and cone, point upward, in 6½ fathoms, 2.3 miles 273° from No. 5.

South buoy, No. 4, red conical with staff and cone, point upward, at the southeast extreme of the ridge, lies in 11 fathoms, 1.5 miles 203° from No. 2 buoy.

West buoy, No. 7, is a black spindle buoy with staff and cylinder, in 6 fathoms, 2.8 miles west, from No. 4 buoy, Calais Lighthouse bearing 183°, distant 7.5 miles.

Caution.—Mariners are cautioned not to place implicit trust in these buoys maintaining the assigned position, for, in addition to the liability of their being drifted from their positions by the sea, they are, especially in the autumn months, often fouled by the nets of the fishing craft which frequent these waters in considerable numbers.

Light vessel.—About 1 mile westward of the northeast end of the Outer Ruytingen a light vessel is moored in a depth of 10 fathoms, from which a flashing red light is exhibited at an elevation of 39 feet above the sea, visible 11 miles.

The light vessel is painted with red and black alternate streaks, with RUYTINGEN in white on sides, and carries a red cage at the masthead; she lies with Gravelines Lighthouse and Dyck Light Vessel in line, bearing 194°.

Watch buoy.—A white spindle mark buoy is moored in 18 fathoms of water to the southwestward of the light vessel.

Fog siren.—In thick or foggy weather a siren is sounded. If out of order, a bell will be sounded.

Tidal streams.—The approximate rate and direction of the streams at the Ruytingen Light Vessel are as follows:

Time of tide at Dover.	Tidal stream at light vessel.
5 hours before high water	W. S. W. from 1½ to 1¼ knots.
4 hours before high water	S. W. by S. from ½ to 1½ knots.
3 hours before high water	S. W. by S. from ½ to 1½ knots.
2 hours before high water	S. S. W. from ½ to 1¼ knots.
1 hour before high water	South from 0 to 1 knot.
High water at Dover	N. E. by E. from 0 to 1 knot.
1 hour after high water	N. E. from ½ to 1¼ knots.
2 hours after high water	N. E. from ½ to 1½ knots.
3 hours after high water	N. E. by N. from ½ to 1½ knots.
4 hours after high water	N. N. E. from ¼ to 1 knot.
5 hours after high water	N. N. E. from ¼ to ¾ knot.
6 hours after high water	Slack.

Inner Ruytingen.—The body of this bank lies 2.5 miles eastward of the northern part of Outer Ruytingen, and, within a depth of 5 fathoms, it is 6 miles in length in a northeast by east and opposite direction, with a maximum breadth of 2 miles. The shoalest water, 1½ fathoms, is toward its south end, but there are patches of 2½ and 3 fathoms near its north extreme, and other patches southward of the bank with the 10-fathom edge. Its irregular depths cause an uneasy sea.

The channel between Inner and Outer Ruytingen has a least depth of 8 fathoms. Gravelines Light and Ruytingen Light Vessel are sufficient marks for its safe navigation.

Bergues.—The west extreme of this bank lies 2 miles eastward of Ruytingen Light Vessel, and within a depth of 10 fathoms is 7 miles in length; it has general depths of 6 to 8 fathoms, but toward its western end is a ridge with 3¾ fathoms, with Ruytingen Light Vessel bearing 250° distant nearly 4 miles. With a fresh breeze against the tidal stream there is a considerable sea over the bank.

The Dyck Banks form one continuous narrow shoal, on which the several banks are separated by depths of less than 6 fathoms. The southwestern end of the shoal, in 8 fathoms, commences 14° 6 miles from Calais Lighthouse and 152° 2 miles from the Outer Ruytingen west buoy; from thence it extends eastward nearly parallel with the shore for 18 miles, almost to the meridian of Dunkerque, and then trends 37° 13.5 miles. The part between its western extreme and the meridian of Gravelines is known as West Dyck or Orteil; the central part, between Gravelines and Grand Synthe, as Le Dyck; and the eastern part as East Dyck or Clif d'Islande.

West Dyck is 9 miles in length, and its greatest breadth is about ½ mile. Its eastern half has less than 5 fathoms water, and there are three or more patches with 3 fathoms from the easternmost of which Gravelines Lighthouse bears south distant 5.5 miles; the depths over the western half of the bank vary from 5 to 8 fathoms. Small craft should avoid passing near the patches of 8 to 10 fathoms which lengthen out this bank westward, as there is a confused sea on their edges when a fresh breeze is opposed to the tide.

Middle Dyck or Le Dyck within the depth of 5 fathoms is nearly 6 miles in length 64° and 244° and from 1,000 to 1,600 yards wide. A large portion of it has depths of 1 to 2 fathoms only. From the center to the eastern end it is steep-to on all sides, but especially on the northwest, where, at 400 yards distance, the depths are from 14 to 15 fathoms.

Gravelines high lighthouse 194°, or in line with Dyck Light Vessel, leads between the West and Middle Dyck in about 3 fathoms. The water is apparently 3 to 6 feet deeper westward of that line according to the chart, but it is subject to change.

East Dyck or Clif d'Islande is separated from the Middle Dyck by a channel nearly 2 miles wide, in which the least depth is about 6 fathoms. The bank has three ridges, the middle of which is 4.3 miles and the other two each some 3 miles in length, with depths of 1 to 3 fathoms and with 3 to 5 fathoms between them in places. It is dangerous throughout its whole extent, as it rises abruptly from depths of 11 to 17 fathoms, particularly on the southeast side. as is the case in nearly all these banks.

The northeastern end of East Dyck is especially to be guarded against; here the depths are only from 3 to 4 fathoms, and the sea is always disturbed around it, as it rises abruptly from the depths of 12 and 16 fathoms, and is therefore difficult to be avoided by the lead. From the shoal spot of 3 fathoms West Hinder Light Vessel bears 301° distant 3.5 miles and Ostende Lighthouse 115° distant 16.5 miles; but this end of the bank being so far from the lowland, the most remarkable objects can be recognized (even from the masthead) only in very clear weather.

Light vessel.—Dyck light vessel is mored in a depth of about 6 fathoms, 3 miles southeastward of the shoalest part of West Dyck, and also within Haut Fond de Gravelines, with Gravelines Pierhead lights bearing 209° distant 2.7 miles.

From the vessel is exhibited, at an elevation of 39 feet above the sea, a flashing white light visible 11 miles.

The vessel is painted with red and black bands, has the name DYCK in white letters on each side, and carries a red cage at the masthead.

Tidal streams.—The approximate rate and direction of the streams at Dyck Light Vessel are as follows:

Time of tide at Dover.	Tidal stream at Dyck light vessel.
5 hours before high water	
4 hours before high water	W. by S. from ½ to 1½ knots.
3 hours before high water	W. by S. from ¾ to 1¼ knots.
2 hours before high water	W. by S. from 0 to ½ knot.
1 hour before high water	E. by N. from 0 to ¾ knot.
High water at Dover	E. by N. from ½ to 1½ knots.
1 hour after high water	E. by N. from ¾ to 1¾ knots.
2 hours after high water	E. by N. from ¾ to 1½ knots.
3 hours after high water	E. N. E. from ½ to 1¼ knots.
4 hours after high water	E. N. E. from 0 to ½ knot.
5 hours after high water	
6 hours after high water	

Inner Ratel within a depth of 3 fathoms is 6.5 miles in length with depths of 1 foot to 2 fathoms over the greater part of it. Its south end is connected by a ridge with Le Dyck and Breedt Banks, over which there are depths of 4 and 3¼ fathoms, respectively; the southeast side of the bank is very steep-to.

Outer Ratel, situated northeastward of the Inner Ratel, and southeast of and parallel to East Dyck, is 9 miles in length within the depth of 5 fathoms, with depths of 1¾ to 2½ fathoms over the greater portion of it. Its name, meaning rattle, is perhaps derived from the noise caused by the heavy sea on it in bad weather.

The Outer Ratel ought not to be crossed, even by small craft, without the calmest of weather. It is separated from East Dyck, as well as from the eastern end of Breedt, by depths of 7 to 12 fathoms. A bank 1.3 miles in length, with 4¼ fathoms water, lies midway between its north extreme and that of East Dyck.

Haut Fond de Gravelines, a small sandy flat 1.5 miles in extent on which the least water is 3 fathoms, lies 1.5 miles westward of the western end of Breedt Bank; from the shoalest spot Gravelines Lighthouse bears 177°, distant 3.8 miles.

A spindle buoy, red and white horizontally striped and surmounted by two cones, points together, marks the south edge of the flat.

Nieuport Bank—Light and bell buoy.—A light and bell buoy, painted in white and red horizontal bands, and exhibiting a fixed white light, has been established in the eastern approach to Dunkerque; it is moored in a depth of 5½ fathoms on the southwestern edge of Nieuport Bank, about 12 miles northeastward from Dunkerque Harbor.

Breedt Bank is the largest of the Dunkerque banks, and joins the Inner Ratel by a bar of sand with 3¼ fathoms, as before mentioned. Its western extreme in 5 fathoms lies 3.3 miles 335° from Gravelines Point, from whence it extends eastward for about 15.5 miles to its eastern extreme of 5 fathoms, which is situated with Nieuport Lighthouse bearing 101°, distant 8.5 miles.

There are several flats on the bank with from only 2 to 3 feet, and over the greater portion the general depth is from 1 to 2 fathoms, with depressions in places, subject to change, and only available to coasters with local knowledge.

East Breedt Bank is a continuation northeastward of Smal Bank, mentioned below; within the 3-fathom line it is 3 miles in length, with charted depths of 2¼ to 2¾ fathoms. Depths of less than 5 fathoms extend 2 miles northeast of it, and its south end is connected by a ridge with Smal Bank, with from 4¼ to 5 fathoms over it.

Smal Bank.—The western end of this bank lies 1.5 miles northward of Dunkerque Pier Lights, which extreme is connected with Breedt Bank by a ridge with 2½ fathoms over the deepest part of it, and is practically part of the same bank. From thence it extends about 15 miles east-northeastward nearly to East Breedt Bank, above mentioned. The southeast horn of it continues 5 miles farther, nearly to Ostende, and is known as Nieuport Bank. The western half has only from 1 to 6 feet and is dry in one spot, with depressions in places; the eastern half has from 2 to 3 fathoms; the bank is steep-to in places on its southeast side. Smal Bank is joined to Hills Bank, inshore of it, by a bar with 2 fathoms water.

Bank bounding Dunkerque Road.—The successive parts of this long bank trending parallel to the shore at 1.5 to 2 miles distant are, respectively, named Snouw, Braek, Hills, and Traepegeer. From the western end of the Snouw in 5 fathoms to the point of junction with the shore of the eastern part of the Traepegeer, the length of the united banks is not less than 16½ miles; their width from 600 yards to 1 mile. They give shelter to Dunkerque Road, which is entered from the westward by West Pass and from the eastward by the Zuidcoote Pass, the whole of the southern side of the banks being well buoyed.

Snouw Bank, the western part of the long bank just described, is 4 miles in length, with less than 3 fathoms and with 6 feet and possibly less on the central half of it. The western end of Snouw Bank is 2 miles 329° from Gravelines Point. Its southern edge is marked by black buoys; the westernmost and others are gas buoys.

Braek Bank is only separated from the Snouw by a narrow channel with about 3 fathoms water. It is about 5 miles in length, beginning abreast of the center of the Snouw and ending just eastward of Dunkerque. The depths are only from 1 to 2 feet, and some patches dry at the lowest tides. The Braek is very steep-to, and with northerly winds the sea breaks upon it with great force.

Hills Bank is a continuation of the Braek, extending 3.5 miles farther in an easterly direction and terminating suddenly in the Zuidcoote Pass, the narrow channel which separates it from Traepegeer Bank. The shallowest part of the bank is a flat from 400 to 1,600 yards wide, the southern part of which dries as much as 6 feet at low water; and on the remainder the depths are only from 1 to 6 feet. The southern side rises precipitously from depths of from 7½ to 10 fathoms, rendering it dangerous to crafts turning to windward in the eastern part of Dunkerque Road, but for the buoys marking its edge.

Traepegeer Bank, with as little as 2 feet water in places, bounds Dunkerque Road eastward and its western end forms the eastern side of Zuidcoote Pass. The Traepegeer joins Brours Bank which fronts the shore to the entrance of Nieuport.

Banks north of Dunkerque Banks.—These banks are dangerous, not only from their shallowness and their being so liable to change in form that anything but the latest charts may be very misleading, but also from their being at so great a distance from the shore that the position of a vessel is not always accurately known with regard to them, and that they lie directly in the route of vessels bound for the Schelde. There is but a slight rise of tide on these banks.

Fairy Bank, a sand bank with from 3¾ to 10 fathoms water, is situated on the eastern side of the deep fairway from Dover Strait, with a channel between it and West Hinder about 2½ miles wide. From its southern end as charted Dunkerque Lighthouse bears 169° 18 miles, and West Hinder Light Vessel 73° distant 6.5 miles. From thence it extends northeastward nearly 10 miles, it greatest breadth not exceeding 1,600 yards.

There are two ridges shown on this bank; that near the middle, with less than 5 fathoms water, is 2.5 miles in length, and from its shoalest spot of 3¾ fathoms Dunkerque Lighthouse bears 177°, 22 miles. The other flat, with 5¼ fathoms, is near the northern end of the bank. Dunkerque Lighthouse is visible in clear weather from the southern end of Fairy Bank.

A shoal about 8 miles in length, with from 6½ to 10 fathoms water, lies 2 miles westward of and nearly parallel with Fairy Bank.

North Hinder, a dangerous shifting sand bank, situated northeastward of Fairy Bank, is charted about 7.5 miles in length 14° and 194°, and from 1,000 to 1,600 yards in breadth, with depths under 10 fathoms; it is probably of less extent that is shown on the chart. On its southern part a narrow ridge with 4 fathoms, and possibly less, extends 2.5 miles southward from about the middle of the bank, steep-to on its eastern side. From the northern end of the bank, as charted, Galloper Light Vessel bears 274°, distant 25 miles.

Between and within North Hinder and Fairy Banks are several banks with from 8 to 10 fathoms water.

Light vessel.—North Hinder Light Vessel is moored in about 17 fathoms, 1.3 miles eastward of the southern end of the shallow part of North Hinder Bank. From the main masthead is exhibited, at an elevation of 46 feet (30 in bad weather) above the sea, a group flashing white light, visible 12 miles.

The vessel has one mast, carrying the lantern, and a mizzen mast without day mark. She is painted red, with white strake marked NOORD-HINDER on her sides.

If the apparatus of the light is out of order a fixed white light will be exhibited in lieu of the flashing light, and a flare light will be shown just above the bulwarks.

If the light vessel is out of position, neither the flashing light nor the usual riding light will be shown, but a red light will be exhibited at bow and stern. By day a red flag will be shown at mizzen.

A gun, followed by a rocket at night, denotes that assistance is required on board the light vessel.

Fog signal.—In thick or foggy weather a siren is sounded; if the siren is out of order, a bell is struck.

Buoys.—A red can buoy is moored at a distance of about 860 yards 34° from the light vessel, and a red conical buoy at the same distance, 216°, from it.

Submarine fog bell.—This light vessel has been furnished with a submarine fog bell.

Should the submarine bell be working for practice with passing vessels the international code signal Z. N. Q. will be hoisted.

Signal station.—Vessels can communicate with the North Hinder Light Vessel by the international code, and their messages will be transmitted to the shore by radio.

Storm signals are made from the lightship.

Tides.—It is high water, full and change, at North Hinder, at about 1h. 0m. the same as at Flushing.

Tidal streams.—The approximate mean direction and rate of the tidal streams at North Hinder Light Vessel are as follows: The maximum observed for the north-going streams 2¼ to 3 knots, and for the south-going stream 2½ to 2¾ knots, at both the Hinder light vessels. The strength is naturally much affected by gales.

Time of tide at Dover.	Tidal stream at light vessel.
5 hours before high water	W. by S., turning, from ¼ to ½ knot.
4 hours before high water	SW. by S., from ½ to 1 knot.
3 hours before high water	SSW., from 1 to 1¾ knots.
2 hours before high water	S. by W., from 1 to 1½ knots.
1 hour before high water	S. by W., from ¾ to 1¼ knots.
High water	Turning, S. to E., from ¼ to ½ knot.
1 hour after high water	Turning, E. to NE., from ¼ to ½ knot.
2 hours after high water	NE. by N., from ¾ to 1¼ knots.
3 hours after high water	NNE., from 1 to 1¾ knots.
4 hours after high water	N. by E., from 1 to 1½ knots.
5 hours after high water	N. by E., from ¾ to 1 knot.
6 hours after high water	N. by W., turning, from ¼ to ½ knot.

West Hinder, a sand bank, charted about 14 miles in length in a northeast and southwest direction, within the 10-fathoms line, and from 1,400 yards to 1.3 miles wide, lies eastward of Fairy Bank and southward of North Hinder. A narrow ridge forms the center of the bank, extending its whole length, with depths from about 2¾ to 4 fathoms. By daylight, the bank may generally be discerned by the tide ripples over it; but the lead should be kept carefully hove when approaching any of these banks.

The only passage practicable for deep-draft vessels bound to Flushing from the westward, and intending to enter the Schelde by the Wielingen Channel, is between the Outer Ruytingen, Bergues, and East Dyck on the one side and the Fairy and West Hinder on the other.

Light vessel.—Near the southern end of West Hinder Bank, and on its eastern side, in a depth of 17 fathoms, is moored a light vessel, from which is exhibited, at an elevation of 40 (33 in bad weather) feet above the sea, a group-flashing light showing two white flashes and one red flash alternately and visible 12 miles.

The vessel is painted black with a red streak, and has the name West Hinder on both sides; there is a conical framework at the masthead.

Should the flashing apparatus be out of order, it will be replaced by two fixed lights, vertical—the upper red, the lower white, and a white flare light will be also shown every 10 minutes. Should the light vessel drift from her station, the flashing light will be replaced by three fixed lights, vertical—the center light red, the other two white; by day, in this latter case, a red flag will be hoisted at the mainmast head. Should the light vessel require assistance—by day, the flags N.C. of the International Code will be displayed; by night, in addition to the distinguishing and riding light, a white light will be shown at the taffrail, and a red rocket will be fired every 15 minutes.

Fog signal.—During thick or foggy weather a siren is sounded. If siren is disabled, a bell is sounded.

Watch buoys.—Two conical buoys, painted in red and black horizontal stripes, are moored each at a distance of 550 yards from the light vessel to enable the vessel to be put back in position should she break adrift; one buoy, marked W.H. 1, on the bearing of 278°, and the other, marked W.H. 2, 8° from it.

Danger.—Several obstructions, probably sunken rocks, are reported to exist at a distance of about 2.3 miles 112° from West Hinder Lightship.

Tidal streams.—The approximate direction and rate of the streams at the West Hinder are as follows:

Time of tides at Dover.	Tidal stream at light vessel.
5 hours before high water	S.W. by W., from ½ to ¾ knot.
4 hours before high water	S.W. by W., from ¾ to 1¼ knots.
3 hours before high water	S.W. by W., from 1 to 1¾ knots.
2 hours before high water	S.W. by W., from 1 to 1½ knots.
1 hour before high water	S.W. by S., from ½ to 1¼ knots.
High water at Dover	S. by E. to S.E. by E., from ¼ to ½ knot.
1 hour after high water	N.E. by E., from ½ to 1 knot.
2 hours after high water	N.E. by E., from 1¼ to 1¾ knots.
3 hours after high water	N.E. by E., from 1½ to 2 knots.
4 hours after high water	N.E. by E., from 1 to 1¾ knots.
5 hours after high water	N.E. by E., from ½ to 1 knot.
6 hours after high water	N.W. by N. to W. by S., ¼ knot.

East Hinder, a sand bank, charted about 9.5 miles in length in a 20° and 200° direction, and 1,200 or 1,400 yards wide, within a depth of 10 fathoms, lies about 3.5 miles eastward of North Hinder. It has three or more ridges, with depths from 3¾ to 5 fathoms and 6 or 7 fathoms between them. The bank is steep-to on both sides and separated from North Hinder by a channel 3 miles wide, with depths from 16 to 20 fathoms, and from West Hinder by a channel nearly 2 miles wide with 15 fathoms.

About midway between the southern end of East Hinder and the East Dyck there is a narrow bank 4.3 miles in length, with from 5 to 8 fathoms.

Bligh Bank, of sand, is charted 10 miles in length, from ½ mile to 1.3 miles in width, and lies from 2 to 2.5 miles eastward of and nearly parallel to East Hinder.

This bank is steep-to and has irregular depths of from 4¾ to 10 fathoms, the least depth being charted in the position noted in margin. There is a 5¼-fathom patch at the southern extremity; also a 5-fathom patch near the northern end of the bank, with a patch of 9 fathoms at 2.5 miles northward of it.

Thornton Ridge, situated about 9 miles southeastward of Bligh Bank, is about 3 miles in length by ½ mile in breadth within the 5-fathom limit, with depths of 2 to 3 fathoms in places. From the shoalest part of 2 fathoms Ostende Lighthouse bears 186° distant 19 miles. The general depths on the surrounding bank, which extends 3 miles northeast and 8 miles southwestward, are from 6 to 10 fathoms. The land in the neighborhood of West Kapelle and the lights of West Kapelle and of Ostende may be seen from this ridge in clear weather.

Banks with depths of 8 to 10 fathoms lie between Thornton Ridge and Bligh Bank.

Light and whistle buoy.—A red and white checkered light and whistle buoy, marked "THORNTON BANK," is moored a short distance northeastward of Thornton Ridge, showing a group-occulting white light. The light, elevated 26 feet above water, is visible 8 miles. The buoy is liable to drift.

Several shoals, with depths of from 6 to 9 fathoms, lie between Thornton Ridge and Outer Ratel, within 13 miles of the shore, the shoalest of which, with 5½ fathoms, is situated 1° 11 miles from Ostende Lighthouse. They are in the track of vessels from the eastward making for the Zuidcoote Pass.

The Coast.—The sand hills forming the coast between Calais and Gravelines may be seen in clear weather when 8 or 9 miles distant, but some parts are so low that embankments are thrown up as a protection against the sea. The only objects that can be recognized on the level land adjoining the shore are Hemmes de Marck and Oye Church spires, the two windmills near Oye village, and the telegraph cable beacons at the Huttes d'Oye.

At low water the sandy strand extends a mile from the shore between Calais and the Walde Light, as well as off the entrance to Gravelines, but to a less distance between. Depths of less than 5 fathoms will be found at nearly 2 miles from the shore 8° of Calais Church and abreast of Gravelines and about a mile from the shore opposite to Oye windmills, but within that depth the slope of the bottom is steep and somewhat irregular, which tends to cause a heavy sea with onshore winds.

Walde Light.—Near the outer edge of the sand, which dries at low water springs, 1,600 yards from the shore at Walde Point and 3 miles 53° from Calais Lighthouse, is an iron hexagonal beacon 59 feet high, from which is exhibited, at an elevation of 36 feet above high water, a group flashing white light, visible 11 miles.

Rescue stations.—There is a rocket station at the coastguard at Fort Vert, 3 miles east of Calais, and life lines, thrown by a musket or small gun, are kept at Walde Lighthouse.

Prohibited anchorage.—The telegraph cable between France and Denmark (from Calais to Fano Island) leaves the shore near the Huttes d'Oye and passes close westward of No. 5 Outer Ruytingen Buoy. It is indicated by two beacons on the shore, each of which is surmounted by a hexagonal prism, partly white and partly red. Vessels should not anchor on or near the direction indicated by these beacons.

Caution.—Shipwrecks are frequent between Calais and Gravelines; they are in great measure attributable to neglect of the lead and to inattention or want of knowledge as to the times of change of the tidal streams, which are much later at the Galloper Light Vessel, from whence vessels from the North Sea usually take their departure, than on the French coast. See direction and rate of tidal streams on chart.

Gravelines.—The entrance to this small tidal harbor lies 10 miles eastward of Calais, and its position may be easily recognized by the houses of the two villages, Grand and Petit Fort Phillippe, built close to the sea on each side of the entrance channel, the square tower of the church at the larger village, and by the lighthouse. The harbor is under the ramparts of the northwestern part of Gravelines, at the mouth of the river Aa, but about a mile within the coast line; from the offing only the towers of the cathedral are seen, the town being hidden from view by trees.

The population of the port is about 11,000.

Trade.—The principal imports are wood, coal, woolen goods, bricks, and cement; the exports, eggs, fruit, vegetables, etc.

Bar—Depths.—The entrance to the channel leading into Gravelines Harbor is frequently obstructed by a bar formed of the sand driven in by westerly winds and sea. The height and extent of this bar depend both on the duration of these winds and on the body of fresh water running out of the harbor. At its medium state it is about 5 feet above the level of the lowest tides; at such times there is a depth of 16 feet over it at high water springs and 12 feet at neaps. When the freshets of the River Aa are accompanied by northeasterly winds, it sometimes disappears altogether for several days.

The harbor is accessible to vessels of 14 feet draft at high water springs. At weak springs those of 11½ or 12 feet can enter it during 5 or 6 days; that is to say, for 2 or 3 days before full and change and 3 days after, but at the lowest neaps it is only accessible to vessels of about 8 feet draft.

The entrance channel trends south-southeastward for 2 miles in almost a direct line from the pierheads to Gravelines.

The outer part of the channel, 1,600 yards long and 305 feet wide at the entrance, is inclosed between two stone piers; these piers are continued seaward by about 330 yards of woodwork to the pierheads.

The inner part of the channel, between Fort Phillippe and Gravelines, is rather more than a mile long and 100 yards wide, and is inclosed between embankments which serve for towing paths. The channel has a steep slope on either side, forming good grounding berths for the numerous fishing craft which frequent this part of the harbor. In the summer the depth is maintained by scouring waters released by sluices from the fosses of the fortifications, but at other seasons the abundant freshets of the River Aa, caused by rain and by the melting of the snow, clear both harbor and entrance channel, as previously mentioned.

The tidal harbor is on the northwestern side of the town, and is about 300 yards long, occupying half the breadth of the channel by which the course of the Aa has been straightened. There is a gridiron and careening place in this harbor capable of taking vessels of 150 to 200 tons. The berths of muddy sand, alongside the quays bordering the harbor on the town side, dry about 5 feet at springs.

The wet dock, or Bassin Vauban, is 1,083 feet in length by 147 feet average breadth; it is entered from the tidal harbor by dock gates 33 feet wide, and it again communicates with the River Aa and hence with the inland navigation by other gates. It is also in communication with the railway by means of a siding. The sill at the entrance is about 3 feet above the level of low water springs; at high water springs there is a depth of 18¼ feet and at ordinary neaps 14¾ feet over it.

Semaphore.—There is a semaphore station close to the lighthouse.

Lights—Gravelines Lighthouse, a white circular tower 89 feet in height, stands at the eastern side of the entrance near the inner end of the East Pier. From it is exhibited, at an elevation of 95 feet above high water, a fixed white light with red sector, visible 15 miles; obscured elsewhere. The red illuminating power is only about half that of the white.

An additional light, fixed white, is shown from the upper gallery of the lighthouse at an elevation of 90 feet above high water, visible 13 miles when bearing from 79° through south to 187°.

West pier—Tidal light.—A fixed green light, visible 2 miles, is exhibited above a shed on the end of the west pierhead; this light is elevated 25 feet above high water and is shown when the depth exceeds 9 feet.

East Pier.—A fixed red light visible 4 miles, is shown from a white iron column on the East pierhead; this light is exhibited all night, and is also 25 feet above high water.

Tides.—It is high water, full and change, in Gravelines harbor at noon, springs rise 21¼ feet, neaps 17¾ feet above the datum, which is that of lowest spring tides. The tide rises very slowly in the first 3 hours of the flood, but rapidly between the third and fourth hours. High water slack lasts from a quarter to half an hour in the harbor, but there is very little change in height for about 1½ hours at and near high water. Strong winds from northwest by west to northwest by north cause the tide to rise higher, and those from southeast have a contrary effect.

Off the pierheads the eastgoing stream is at its greatest strength, about 3 knots, at the time of high water in the harbor.

Pilots.—Eight pilots are stationed at Gravelines; when the sea is too high on the bar for them to board vessels in the offing, they go as far as they can and wave a flag to indicate the direction to be steered; in such cases, however, it is most dangerous to attempt the entrance.

A lifeboat is stationed at Gravelines.

Directions.—The directions for approaching Calais apply also to Gravelines. Vessels arriving off Gravelines some time before the tide serves may anchor westward of the harbor and northward of Oye Church spire (being careful to avoid the telegraph cable) at 1.5 or 2 miles from the shore, in a depth of from 5 to 8 fathoms, good holding ground; from this anchorage a vessel will have a favorable tide to enter the harbor. This anchorage, however, is anly safe during fine weather, for the sea is heavy with strong onshore winds.

The most favorable winds for entering the harbor are those from northwest by west to northeast by north, but if fresh they cause a high sea at the entrance, and it is then necessary to be quite certain that there is sufficient water over the bar to avoid striking. With fresh winds from southwest by west to west by north the sea is smooth on the bar. The entrance is easy with northeasterly winds when they are too fresh. Except with strong easterly winds, vessels should pass close to the west pierhead.

With a head wind a vessel should employ the tug.

The coast—Aspect.—From the entrance to Gravelines, to that of Dunkerque, a distance of 10 miles, the coast is low, with sand hills in places. The only objects visible from any considerable distance at sea in clear weather are the Great and Little Cassel, two isolated hills southward of Dunkerque. The town of Cassel stands on the summit of the Great Cassel; the other hill is of a conical form. The buildings recognizable near the coast are the large chimney near Gravelines Point, the spires of the churches of Mardick, Grand Synthe, Petite Synthe, and St. Pol, emerging from the trees which surround the villages, and the towers and lighthouse at Dunkerque.

Gravelines Point lies about 4 miles eastward of Gravelines pierheads, and the sand hills composing it lie in several parallel ridges and are visible in clear weather 9 or 10 miles. A chain of sand hills covered with verdure extends 2 miles westward from the point, and those bordering the shore for about 2 miles eastward are about the same height as those at the point; but beyond this, and to within a short distance of Dunkerque, they are covered with bent grass and lie in parallel ridges ½ mile in the rear of an embankment, fronted by a low strand which covers at high water, springs. There are several coast guard stations.

Between the entrance of Gravelines and Gravelines Point, the sands dry about ½ mile out from the beach at springs, abreast of the point they dry 600 yards, and between the point and Dunkerque 1,200 to 1,600 yards. The sand carried eastward by strong westerly winds is arrested by the jetties at Dunkerque and accumulates between Mardick and Dunkerque, where it forms an immense heap, of which the highest parts barely cover at springs. Of all the obstacles to the improvement and deepening of Dunkerque this high bank of drifting sand has always proved the most difficult to combat.

Beacons.—On Gravelines Point is a large wooden beacon. Several other wooden beacons are placed along the shore between Gravelines and Dunkerque; they are used in fixing the positions of the buoys marking Dunkerque Banks, and are as follows: About 1 mile westward of Gravelines Point are the Gravelines Beacons; one is on the dunes on the shore, surmounted by a ball above a cone, the other, No. 4 beacon, is about 800 yards to the northward on the sands, the two forming a line for the gas buoys in West Pass. Two other beacons of less size, numbered 2 and 3, are erected on the sands at varying distances apart to the eastward. The Mardick Beacon, surmounted by a cone and ball, stands on the sand hills between Gravelines Point and Mardick Church.

Lifeboat.—A lifeboat is established on the beach, north of the village of Fort Mardick.

Mardick Bank, with a general breadth of 1,000 to 1,200 yards and from 1¼ to 3 fathoms water over it, extends 3.7 miles parallel with the coast, its western end joining the shore sands about 1 mile eastward of Gravelines piers. Another shoal, of which the outer edge is steep-to, joins the strand between Mardick and Dunkerque, and, extending 1.5 miles from the beach, forms, with the Mardick Bank, the southern side of the West Pass.

Inshore of this and of Mardick Bank is the Fosse de Mardick, which has from 3 to 4 fathoms water, but it should always be avoided, as each end terminates in a blind channel.

West Pass into Dunkerque Road.—West Pass, between Dyck light vessel and Dunkerque, is 8 miles in length and 670 yards in breadth in its narrowest part, with not less depth than 5¼ fathoms at low water. It is lighted and buoyed as follows:

Light vessels.—Dyck light vessel, in the western approach to West Pass, has been described with the Dyck Banks.

Tidal streams.—The approximate rate and direction of the streams at West Pass are as follows:

Time of tide at Dover.	Tidal stream at West Pass.
5 hours before high water	W. ½ S. from ½ to 1¾ knots.
4 hours before high water	W. ½ S. from ½ to 1½ knots.
3 hours before high water	W. ½ S. from ½ to 1½ knots.
2 hours before high water	W. ½ S. from ¼ to 1 knot.
1 hour before high water	E. by N. from 0 to ½ knot.
High water at Dover	ENE. ½ E. from ½ to 1½ knots.
1 hour after high water	ENE. ½ E. from ¾ to 2¼ knots.
2 hours after high water	ENE. ½ E. from ½ to 1½ knots.
3 hours after high water	ENE. from ½ to 1¼ knots.
4 hours after high water	ENE. from 0 to ½ knot.
5 hours after high water	Slack.
6 hours after high water	W. from ¼ to ½ knct.

Gas buoys, etc.—The limits as well as the direction of West Pass are defined by seven buoys on each side of the channel, black on the northern side, red on the southern. The black buoys bear odd numbers from 1 to 13, the red buoys even numbers from 2 to 14; the numbers commencing from the westward, at the west end of Snouw Bank.

Of the black buoys on the northern side Nos. 1, 5, 9, 13, and 15 are light buoys showing red fixed lights; Nos. 3 and 11 are conical, with cylinder top marks.

Of the red buoys marking the southern side placed near the edge of the Mardick Bank and of the shoal bank extending from the shore, Nos. 2, 6, 10, 14, and 16 are light buoys, showing fixed green lights; Nos. 4, 8, and 12 are conical buoys, each having a triangular top mark. No. 8 is also a bell buoy.

Directions.—The approach to Dunkerque from the westward is through West Pass, which has a depth of not less than 5¼ fathoms in the fairway at low water. The directions for the approach to Calais apply also to Dunkerque. Coming along shore from Calais, which affords the deepest water, Dyck Light Vessel bearing 79° will lead through the fairway of the approach. Pass on either side of the light vessel and thence making the entrance to Dunkerque Road from the westward; the Dyck Light Vessel is difficult to pick up by night, owing to its light being absorbed by the flash of the 20-mile Dunkerque Light, between the black buoys on the northern side and the red buoys on the southern side of Dunkerque Road.

Most of the buoys being lighted, red on the northward and white and green on the south side, afford easy access at night.

Coming from the northward, from Ruytingen Light Vessel, the course is 197°, direct for Gravelines Lighthouse, until near the Dyck Light Vessel, when course may be altered to pass between it and Snouw Bank West Buoy No. 1, and thence into West Pass as before.

This track is over a depression in the Dyck Banks where there may not be more than 3 fathoms at low water.

At night, from Ruytingen Light Vessel on the same course as before mentioned, a vessel will be in the white sector of Gravelines Light, and should keep in it until near Dyck Light Vessel, which lies in the white sector, thence into West Pass.

Directions—Dunkerque Approach—Fairway reserved for traffic when submarine vessels are exercising.—When the flag with a yellow and a red horizontal stripe is hoisted at the signal stations or on the vessel escorting submarine vessels to indicate that the latter are exercising submerged, all vessels wishing to enter or leave the port of Dunkerque are earnestly requested to make use of the fairway, defined below, in which submarine vessels are prohibited from exercising submerged.

This fairway comprises all that part of West Pass and Dunkerque Road which is limited as follows: On the west, by the meridian of Dyck Light Vessel; on the east, by the alignment (192°) of the belfry tower of the Hotel de Ville and the tall chimney of the Chantiers de France. The above limits have not been placed on the chart plates.

Zuidcoote Pass (east pass) into Dunkerque Road.—The Zuidcoote Pass is very narrow at the point where it opens into the eastern part of Dunkerque Road; it lies between Hills and Traepegeer Banks and is reported to have a depth of 12 feet only at low water. Hills Bank has extended 165 yards to the southward between buoys Nos. 4 and 6.

Buoys.—The south and eastern limits of Hills Bank are defined by four red buoys with even numbers from 2 to 8, commencing from the eastward; the Traepegeer Bank by two black buoys on its northern side; the westernmost is marked No. 1.

Of the red buoys No. 2 is conical, with conical top mark; Nos. 4 and 6 are light buoys exhibiting a fixed green light; No. 8 is painted in red and white horizontal bands and exhibits a fixed white light.

Black light buoy No. 1, showing a fixed red light, marks the northwestern edge of the Traepegeer at the entrance to the Zuidcoote Pass.

A light-and-whistle buoy painted black, surmounted by a ball marked "TRAEPEGEER BK," is moored on the northern edge of Traepegeer Bank 2.3 miles 325° from La Panne Light. It exhibits a group occulting red light.

The buoys on the eastern slope of Hills Bank, which is very steep, are very liable to drift, but the greatest care is taken to keep them in their proper position.

La Panne Light is fixed red, elevated 66 feet above high water, and visible from a distance of 6 miles.

La Panne is a lifeboat station, and storm signals are shown here for the guidance of the fishing boats.

Broers Bank light and bell buoy.—A light and bell buoy, painted red, and marked "BROERS BANK," has been moored in a depth of 2 fathoms, on eastern edge of the bank, on western side of La Panne Pass. It exhibits an occulting white light.

Den Oever light buoy.—A black light buoy, marked "BK. DEN OEVER," and showing an occulting red light, is moored on the western edge of Den Oever Bank, eastern side of La Panne Pass.

Directions.—Approaching Zuidcoote Pass from the eastward through West Deep, pass northward of the black buoys marking Traepegeer Bank, thence with No. 2 red buoy a little on the starboard bow, steer to make about 217° until the spires of the eastern church of Bergues are open a little westward of Leffrinckoucke church tower, 194°, which will lead through in about 13 feet (possibly a foot less) at low water, eastward of No. 4 red buoy. When Mardick Battery, on the shore westward of Dunkerque, is in line with the pierheads, steer for it till abreast No. 6 buoy, when Dyck Light Vessel being steered for leads to the road.

The chart shows deeper water nearer No. 4 buoy than on the leading mark given, but the banks are subject to change, and therefore it is necessary to be certain that the tide has risen sufficiently before taking the channel in vessels of other than light draft.

If a vessel's draft permits of turning through the Zuidcoote Pass the lead must be hove quickly to avoid coming suddenly upon the banks on either side, which are steep-to, particularly Hills Bank; the tidal stream is very strong here at and near springs.

La Panne Pass lies between Traepegeer Bank and the coast and is available for small craft with local knowledge during fine weather and weak tides; at other times it breaks and is dangerous. It is not buoyed, but has a low-water depth of 4 feet on the bearing of La Panne Light 199°.

Dunkerque Road is from 600 to 1,200 yards in width with depths above 5 fathoms, and 5 or more miles in length, and is chiefly used as a temporary anchorage by vessels intending to enter the harbor. It is fairly sheltered by the banks seaward of it, though there is a considerable sea in heavy weather, but the pilots consider that vessels with good ground tackle can ride out a gale from the offing. In the winter of 1870–71, a French squardon remained for many months in the road and reported favorably of it; the banks, even at high water, were found to afford sufficient shelter for them.

With northerly winds there is a heavy swell in the West Pass, between No. 9 lightbuoy and Dunkerque Road; in such a narrow channel, under such conditions, it is difficult to steer a long ship.

The Great or western road, with from 8 to 9 fathoms, good holding ground, commences northeast of Mardick church and extends rather beyond the line of Nos. 13 and 14 buoys to about a position from which Dunkerque Lighthouse bears 132°; it is in some degree sheltered during northerly gales by the shallow part of Braek Bank. It is in this part of the road that sailing vessels of deep draft anchor, with westerly winds, when they have to wait for high water to enter Dunkerque. Small vessels under similar circumstances, and all vessels with offshore winds, may anchor northwest by west about a mile from the harbor entrance, the holding ground being good.

The Little or eastern road commences with Leughenaer Tower in line with Dunkerque Lighthouse, and extends to the Zuidcoote Pass; the depths vary from 8 to 11 fathoms, and the holding ground is good, especially north by east of Dunkerque. Large vessels remaining some time in the Little Road should anchor between the lines of Leughenaer Tower touching the eastern side of the lighthouse, and the same tower on with Dunkerque Belfry Tower; here, during gales from northwest by north to northeast by east, they are better sheltered than in the Great Road by the shallow parts of Break and Hills Banks; and in the event of parting, it is much less dangerous to run ashore eastward than westward of Dunkerque.

Tidal streams.—The streams turn at about half tide; the flood or east-going stream in Dunkerque Road makes at about 3 hours before high water and runs until 2½ or 3 hours after high water, with a maximum speed of 3 knots off the pierheads at high water; the ebb runs to the westward for the remainder of the 12 hours, with a maximum speed of 2½ knots at low water. At their maximum the streams run fairly through the road. There is not much slack at springs; see tides at Dunkerque.

Dunkerque, 10 miles eastward of Gravelines, formerly an arsenal and naval port, is now the principal French commercial port in the North Sea. The town stands at the junction of the Bergues, Bourbourg, and Furnes Canals, and the public buildings are spacious, handsome, and regular. As this port is one of the principal outlets for the great manufacturing Department du Nord, the trade by sea is very large.

Population, according to the census of 1911, amounted to 38.891. The United States is represented by a consular agent.

Communication.—Dunkerque, in normal times, is in railway communication with all parts of France and the Continent, and through the town of Furnes with Belgium. The telegraph service is also very good. By sea, there is regular steam service to London, Hull, Goole, Leith, Rotterdam, Petrograd, Harve, Bordeaux, and Marseille.

Trade.—The principal imports are ores, coal, cereals, seeds, molasses, nitrate of soda, wood, wool, flax, petroleum, jute, and pig iron. The exports are coal, forage, potash, rails, and casks. Cod and herring fisheries (Iceland) are carried on.

There is a town hospital at which foreign sailors are received; cases of smallpox or typhoid are sent to the lazaret.

Coal is always plentiful, about 5,000 tons of which, with a limited supply of patent fuel, being usually in stock. Vessels generally coal in the basins, where the depths are 17 to 30 feet according to dock; if they coal alongside the wharf in the tidal harbor, they lie aground in about 8½ feet at low water.

Time signal.—A time signal is shown on Leughenaer Tower, consisting of a ball hoisted at five minutes before the signal, and dropped at 22h. 0m. 0s. Greenwich mean time. It is immediately rehoisted after the signal is made and dropped again two minutes later.

Should the signal fail, the ball will be hoisted half-mast as soon as possible, close up at 22h. 10m. 0s., and dropped at 22h. 15m. 0s. Greenwich mean time.

Radio station.—A radio station has been established at Dunkerque, open to the public from 7 a. m. to 10 p. m.; call letters F.F.D.

The port consists of an entrance channel leading to the tidal harbor of four wet docks or basins and several dry docks. There are also building yards where vessels up to 10,000 tons have been built. Great improvements have been effected in the entrance and tidal harbors of late years by dredging and otherwise, the most important of which is the widening of the entrance channel to nearly double its former width. This port can accommodate steamers of 10,000 tons and more.

Entrance—Depths.—The entrance channel between the piers is 693 feet in width and has a depth of 15 feet at low-water springs; this depth is maintained up to West Lock, when it gradually shoals to 10½ feet, and again to 7 feet at the entrance to the Bassin du Commerce, but off the Ecluse Trystram and Ecluse de l'Ouest (locks of Bassin Freycinet) 17 feet and 10½ feet are obtained respectively.

Water from the canals of the interior and from the ditches of the town is used to scour the harbor and entrance channel, but constant steam dredging in conjunction with flushing is necessary to keep the entrance clear.

Northerly gales cause such a high sea outside the jetties that vessels of heavy draft should not attempt to run in at such times unless the pilots judge the entrance practicable; at neaps the entrance is inaccessible during these gales to all but small vessels.

The tidal harbor is about 1,200 yards in length, from 200 to 500 feet in breadth, and surrounded by quays where several lines of steamers have their regular berths. As far in as the North Lock entrance to the Bassin Freycinet there is a central depth of 9¾ feet, at the lowest tides as before mentioned, and above that there is about 8 feet in the channel to the several dock gates and in the tidal harbor, with probably less water in places alongside the quays. Strong northerly winds cause the swell to enter the tidal harbor for about 2 or 3 hours each tide, but it does not inconvenience a vessel well secured.

Wet docks.—The four wet docks are named, respectively, the Bassin Freycinet (which is being enlarged, 1906), Bassin du Commerce, Bassin de la Marine, and Basin de l'Arriere Port.

All lock gates are opened 2h. 10m. before high water and closed 2h. 50m. after high water.

In 1912 vessels up to a length of 600 feet, with a draft of 30 feet, entered the harbor.

The Bassin Freycinet has been greatly enlarged of late years, having now an area of about 96½ acres; it is entered by the North Lock and also by the East Lock, and admits vessels of 26 feet draft. Three moles extending from its western side divide it into four open compartments, named, respectively, Bassins (de l'Ouest) Nos. 1, 2, 3, and 4; these moles afford large quayage accommodation, with railways and ample facilities for loading and discharging cargo. The northern half of the Bassin Freycinet, including the compartment No. 3, is dredged to a depth of 13½ feet below the zero of soundings, equal to 32½ feet at high-water springs; compartment No. 4 has a little less, and is used by petroleum vessels; the southern half of the Bassin Freycinet has 6½ feet less water, equal to 26 feet at high-water springs. The two halves of this bassin are divided by lock gates over which trains can pass.

The work of extending compartments Nos. 3 and 4, comprising the lengthening of the existing dock accommodation by about 1 mile of quays, has been completed.

The quays are provided with both steam and hand cranes, and there are also two floating cranes of 10 and 40 tons lifting power.

In August, 1910, work was commenced on a fifth wet basin, which will be larger than any now existing here.

This basin will be handed over to shipping in about the year 1915, while a sixth wet basin is proposed.

The North Lock communicates directly with the northern division, and the east lock with the southern division of the Bassin Freycinet; the North Lock is 557 feet long, 69 feet wide on sill, 82 feet at high-water line, and has a depth of 35¾ feet over the sill at high-water springs. The East Lock is 384 feet long, 69 feet wide, and has 24¼ feet over the sill at high-water springs.

The Bassin Freycinet has communication also with the Bassin de la Marine, and also by two locks with the general canal system of the country.

The Bassin du Commerce, of 13 acres area, communicates with the tidal harbor, and also with the Bassins de la Marine and de l'Arriere Port. It has a depth on sill of 20¾ feet at high-water ordinary springs and has good stone quays on both sides.

The Bassin de la Marine, with an area of 7½ acres, is surrounded by quays, and the Bassin de l'Arriere Port, of 6 acres, has a wooden quay on its western side, and communicates with the canal system.

The depth over the sills of these is in each case about 20¾ feet at high-water ordinary springs.

Dry docks.—All the docks at Dunkerque, both dry and wet, are the property of the Government. The dimensions of the four dry docks are as follows:

Docks.	No. 1.	No. 2.	No. 3.	No. 4.
	Feet.	*Feet.*	*Feet.*	*Feet.*
Length over all	366	366	295	625
Length on blocks	351	354	279	608
Width at entrance	67½	64¼	64¼	90½
Depth on sill	25¾	20¾	20¾	25¾

The largest vessel docked in No. 4 was 450 feet in length, 52 feet in breadth, and 15 feet draft.

All the dry docks are entered from the Bassin Freycinet.

Patent slip.—See Appendix I.

Shipbuilding.—The local French shipbuilding yard, known as the Société des Ateliers et Chantiers de France, continues to be active. Since the foundation of this company in 1902 (up to the end of 1910) 67 vessels, totaling upward of 110,000 tons, have been launched from this yard, and complete plant is now being set up to render possible the manufacture on the spot of engines as well as hulls. Five vessels (including a pontoon to carry a floating crane to lift 40 tons) were launched in 1910, the largest being a steamer of 4,375 tons and 1,900 horsepower.

Lights.—**Dunkerque Lighthouse**, a circular yellow brick tower 187 feet high, is situated on the southwest side of the harbor, about 800 yards within the entrance. From it is exhibited at an elevation of 193 feet above high water, a group-flashing white electric light, visible 20 miles.

Leughenaer.—A fixed white light, at an elevation of 85 feet above high water, is exhibited from the Leughenaer Tower (stone, octagonal, 79 feet high), on the east side of the harbor, about a mile above the entrance. This light, specially intended to indicate the direction of the entrance channel, shows brightest when bearing 141°, and on that bearing is visible from a distance of 15 miles. Right or left of this axis the light is visible only within an angular space of 10° or 12°, and its visibility is much decreased.

East jetty head.—A fixed red light, visible at 4 miles, is shown from an iron turret painted yellow on the east jetty head, at an elevation of 36 feet above high water.

Tidal light—West jetty.—From a white tower near the West jetty head, at an elevation of 33 feet above high water, is exhibited a tidal light, visible (according to color) from a distance of 6 to 8 miles. The tidal signals consist of a white light, showing one occultation while the tide is rising, and two occulations when it is falling, the height being indicated by means of colored flashes.

Fog signal.—In thick or foggy weather a bell at the West Jetty Head is rung continuously in answer to fog signals from an approaching vessel.

Special signals.—The following special signals, which are quite independent of the tidal signals, have been established respecting the entry and departure of vessels to or from the port of Dunkerque:

1. Entry into the port and all movement of vessels within the port is prohibited when the following signals, which indicate a vessel leaving, are made: By day, a red flag hoisted at the yard opposite the channel of the signal mast on the west jetty and also at Leughenaer Tower; by night, a red light at the same places.

2. Departure from the port and all movement of vessels within it is prohibited when the following signals, which indicate a vessel entering, are made: By day, a green flag hoisted at the inner end of the Trystram and l'Ouest Locks and also at Leughenaer Tower; by night, a green light hoisted at the same places.

3. Entry into or departure from the port is prohibited when the following signals are made: By day, a red flag hoisted on the yard opposite the channel of the signal mast on the west jetty and a green flag on the mast below the tide-signal flags, and at Leughenaer Tower a red flag over a green flag; by night, a red light over a green light at the same places.

The day and night signals given above (2), prohibiting departure, will be hoisted at the same time at the inner of Trystram and l'Ouest Locks.

A green flag hoisted on the yard opposite the channel of the tidal signal mast on the west jetty by day, or a green light by night, indicates that torpedo boats or tugs may enter at their own risk, although entry for other vessels is prohibited.

4. When vessels are prohibited from entering Trystram Lock the following signals will be made:

a. When entry is temporarily prohibited: By day, a red, white, and blue flag (letter T of the code signals) will be hoisted on the yard opposite the channel on the signal mast of the west jetty; by night, a white light hoisted in the same place.

b. When entry is indefinitely prohibited: By day, a red, white, and blue flag (T) and a blue and white pennant (D of the code signals) will be hoisted on the yard opposite the channel of the signal mast on the west jetty; by night, two white lights hoisted in the same place.

5. If any vessels or boats are in the avant port, channel, or Port d'Echouage when the signals given in (1) and (2) are made they must for the moment place themselves alongside the nearest accessible quay or jetty.

6. The above signals will remain in force as long as circumstances render them necessary.

The captains, masters, or owners of vessels must conform to the information given to them by the signals, without prejudice to any action which may be necessary to take against the pilots in case of infraction. These signals are always to be considered as equivalent to an express and individual order given by the captain of the port.

7. Fishing and all other vessels are prohibited from beating in or out of the port.

Tides.—It is high water, full and change, at Dunkerque at 0h. 8m.; spring rise 19 feet, neaps 15¾ feet above the level of the lowest tides or zero of soundings, which is about 2¼ feet below the level of low water, ordinary springs. Strong northerly winds may raise the tide 2 or 3 feet higher, but the sea is then heavy at the entrance. When easterly winds prevail springs do not rise much higher than do neaps with fresh westerly winds. In the harbor in calm weather high-water slack lasts from a quarter to half an hour, depending on the wind and whether near springs or neaps, and with offshore winds 10 minutes.

Pilots for Dunkerque are always called at night, even near Dungeness, by showing a light six times.

Semaphore.—There is a semaphore station at Dunkerque; it is just in front of the principal lighthouse.

Pilots.—There are 3 chief pilots and about 36 pilots stationed at Dunkerque. Pilot vessels are unable to get out of harbor when there is a heavy sea at the entrance, which is frequently the case, but three out of the four are always cruising at sea. Their stations are one between Dungeness and the Downs, another near the Ruytingen light vessel, and a third near the Dyck light vessel. They all have DUNKERQUE in large black letters on the mainsail and a large black anchor beneath that name. They always endeavor to meet large vessels, but small ones requiring a pilot should make the signal directly they sight a pilot vessel.

Tugs.—The port is well supplied with tugs, whose services are always available.

Lifeboats.—There are two lifeboats at Dunkerque, one at Fort Mardick to the westward, one at Malo-les-Bains to the eastward; there is also a life-saving station at Leffrinckoucke.

Directions—Entering Dunkerque.—The directions for approaching Dunkerque Road by the West Pass are given elsewhere. On entering the harbor the vessel will probably be in charge of a pilot. The best time to enter, if the tidal signals indicate sufficient water, is at about 2 hours before high water, as the tidal stream is then slack and the channel easy, whereas at half an hour before high water the easterly or flood stream is at its maximum, at which time extra precautions must be taken to prevent being set on to the east pierhead. If the vessel is of considerable draft, say, 24 to 26 feet, the best time to enter is from a half to three-quarters of an hour after high water, when the tidal stream is easier than at and before high water.

Strong winds from the offing cause a considerable sea and reduce the navigable depth as much as 6 feet at times off the entrance; strong easterly winds cause a nasty choppy sea, being against the flood tide. The bottom is hard in the entrance and dangerous to strike on.

Sailing vessels other than small craft should have the services of a tug; those that do enter under sail should carry enough sail to maintain perfect control. During light winds every effort should be made to close with the west jetty head to avoid being drifted eastward of the entrance by the east-going stream.

Entering the harbor between the outer piers, owing to the formation and extension of the shoal under the western arm, it is best to keep fair in the middle of the channel.

Proceeding up the harbor there are three large cone-shaped dolphins standing well out into the channel from the end of the jetty near the lighthouse.

Entering at night these dolphins are illuminated by the flash of the high light.

The basin immediately to the westward of the shipbuilding yard is full of small-boat moorings and of lighters; it can not, therefore, be used safely for turning.

The jetty alongside the railway station, on the eastern side of the Port d'Echouage, has very little water, and appears to be used almost entirely by small sailing barges and fishing boats.

Coast.—**Zuidcoote** village is situated about 4 miles eastward of Dunkerque, from ½ to ¾ mile back from the shore. The coast between is low and formed of sand hills and presents nothing remarkable between the Casino of Malo-les-Bains and the semaphore of Zuidcoote, except the Tente Verte beacon, both erected to facilitate the fixing of the buoys in Dunkerque Road. This beacon has, as top mark, two cones, points together. Northeast of the Tente Verte is a coastguard station and battery. The sand dries off this shore to the distance of 670 yards.

Semaphore.—The semaphore erected on the old tower at Zuidcoote is 33 feet in height and stands 124 feet above the sea.

Bray Dunes village lies 1.5 miles eastward of the semaphore, and the village of Ghyorlde, the clock tower of which is visible from the offing, is 1 mile within it.

The frontier line between France and Belgium, marked by beacons not visible from the offing, is situated about 1.3 miles eastward of the Bray Dunes Light.

Tide and tidal streams.—On the northern coast of France, as well as on the English shore from Dover to the North Foreland, the tide at springs rises for 5¼ hours and falls for 7¼ hours; but these times vary according to the moon's age, that of the flood or rising tide increasing progressively from full or change to the following quarter, while that of the ebb, or falling tide, decreases; so that two or three days after the quarter the duration of flood and ebb are alike. The duration of the ebb then increases gradually until the following full or change, and that of the flood decreases. In calm weather both streams in the offing have respectively about the same duration as the rising and falling tide on the shore, and their rate is in proportion to the range of tide. The times of the change of stream, however, do not coincide with the times of high and low water by the shore. The flood or east-going stream is generally less rapid than the west-going stream, but the rate and duration of both are influenced by the winds.

It has not yet been ascertained by any decisive experiments whether the range of the tides between the northern coast of France and the estuary of the Thames is equal to that observed on the surrounding shores. All that is positively known on the subject is that as far as 15 or 16 miles from the French coast the vertical motion of the tides seems to follow very nearly the same law as on the shore; they take place at the same times and appear to rise in an equal degree; but if the rise of water at springs on this coast at Calais, for example, is compared with that observed at the same tides on the coasts of Belgium and Holland, as well as at several positions in the estuary of the Thames, and especially at Orfordness, it would appear that beyond the distance of 15 or 16 miles from the French coast, in an 8° and a 53° direction, the range of tide decreases in the same manner as on the shores.

It is even probable that this decrease is very rapid, for in the middle of the North Sea, in latitude 52° 27′ N., longitude 3° 14′ E., it has been found that the rise and fall did not exceed 3 feet.

Further observations as to the rise and fall in the open parts of the North Sea are required before a definite rule can be laid down, but it is very improbable that the tidal range offshore is the same as on the coast, and caution is therefore requisite in diminishing the depths obtained at high water in order to compare them with the depths on the chart.

The tides on the coasts of France, Belgium, and Holland, as well as on the coast of England from Dover to the North Foreland, are chiefly affected by the tidal wave which traverses in about 8 hours the whole extent of the English Channel. The flood or eastgoing stream, when at its greatest strength, takes a 53° direction, which is only changed near the shore by the trend of the coast.

The tides on the English coast, northward of the North Foreland, are produced by a similar tidal wave, which, after having doubled the northern extreme of the British islands, extends southward along the eastern coasts of Scotland and England and runs directly toward the estuary of the Thames. The flood or southern stream, when at its greatest strength, runs parallel with the English coast, but when it has reached the parallel of Orfordness, and the Thames opens out, it turns to 233° in an opposite direction to that which the flood stream follows near the coast of France. But, as the changes of stream in the offing occur later than near the shore, in proportion to the distance from the land, the stream of flood on the French coast evidently mingles with the ebb stream from the mouth of the Thames, somewhere in the neighborhood of the Gabbard and Galloper banks.

The true stream in the southern part of the North Sea will always carry a vessel toward the North Foreland while the water is rising at Dover, and from it while it is falling at that place. This stream sets nearly northeast by north and southwest by south, except inshore, where it sets in the direction of the coast, and at the entrance of the Thames, where it is diverted from its course by the river. Near Dover Strait the stream runs at the rate of 2½ to 3 knots an hour, lessening to 1½ or 1¾ knots farther north.

Caution.—Mariners should bear in mind that the direction of the tidal stream in the offing, either in the North Sea or Channel, is not to be taken as a sign of the rise or fall of the tide; for, the vessel would be exposed to the greatest danger by running with what might be considered to be the flood stream toward a shoal lying far from the land, under the idea that in consequence of the direction of the stream the water was rising on that shoal, and that it might be crossed. This stream only ceases to be felt in the vicinity of some of those banks which are farthest out from the coasts of France and Belgium, when it is nearly low water on the shore.

When desirous of crossing a bank lying within 15 or 16 miles of the French coast, an approximate calculation should always be made of the number of feet the tide has risen above the soundings shown on the chart. A useful table for readily computing this will be found in the Admiralty Tide Tables, Table B, published annually. This does not apply to banks farther offshore, where, as observed in the remarks on tides, the rise is apparently small.

Table showing the direction and rate of the tidal streams at certain times of tide, during ordinary springs, in the southern part of the North Sea.

Positions and tidal stream.	Time with reference to high water at Calais.[1]	Direction.	Rate.	Duration at the rate given.
	H. m.		*Knots.*	*H. m.*
8°, 1.5 miles from Cape Grisnez:				
Flood	0 40 after	N.N.E.	4.0	
Flood	3 0 after	N. by E	1.5	
End of flood	3 20 after	N. by W	.9	
Ebb	6 20 after	W. by S	3.8	1 30
End of ebb	2 30 before			
87°, 5.5 miles from South Foreland:				
Flood		N.E. by E		
End of flood	5 0 after			
Ebb		S.W. by W		
End of ebb	2 0 before			
323°, 1.5 miles from Cape Blanc-Nez, ebb	4 30 before	S.W by W and W. by S.	4.5	1 30
290°, about 3 miles from entrance to Calais:				
Flood	1 30 before	E. by N	2.4	3 0
Flood	0 30 after		3.5	
End of flood	3 30 after			
Ebb	5 0 before	W	2.7	
Ebb	2 30 before	W. by S	4.0	
End of ebb	2 0 before			
31°, 5 miles from Calais Lighthouse:				
Flood	0 20 after	E.N.E	4.0	3 30
End of flood	5 40 after			
Ebb		W. by S	3.8	
31°, 14½ miles from Calais Lighthouse:				
Flood	0 45 after	N.E. by E	2.4	
Flood	2 10 after	N.E. by E	3.0	
Flood	4 0 after	N.E. by N	1.2	
End of flood	5 10 after	N.W. by N		
Ebb	3 30 before	W. S.W	3.6	2 30
End of ebb	1 20 before	S.E. by S		
357°, 25 miles from Calais Lighthouse:				
Flood	2 20 after	N.E. by E	3.4	
End of flood	5 30 after			
Ebb	3 20 before	S.W. by W	3.2	
End of ebb	0 43 before			
8°, 45 miles from Calais Lighthouse:[2]				
Ebb	2 30 after	N.E. by E	2.7	
End of ebb	5 30 after			
Flood	3 10 before	S.W. by W	2.7	
End of flood	0 30 before			

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[1] The time of H. W. at Portsmouth, as given in the Tide Tables, being practically the same as that for Calais, can be used for the purposes of this table.

[2] In this position and northward of it the northeastern stream is the ebb, and the southwestern the flood.

Table showing the direction and rate of the tidal streams at certain times of tide, during ordinary springs, etc.—Continued.

Position and tidal stream.	Time with reference to high water at Calais.	Direction.	Rate.	Duration at the rate given.
	H. m.		*Knots.*	*H. m.*
20°, 20 miles from Dunkerque Lighthouse:				
Flood	2 20 after	E.N.E	3.0	
End of flood	5 30 after			
Ebb	4 0 before	W.S.W	2.7	
End of ebb	0 40 before			
In Dunkerque Road, northwestward from Dunkerque Lighthouse:				
Flood	0 30 before	E	2.5	
Flood	0 30 after	E. by N	3.5	2 0
End of flood	3 20 after			
Ebb	6 30 after	N.W. by W	3.0	2 30
End of ebb	3 0 before			
In Dunkerque Road, 1 mile northward of Dunkerque West Jetty head:				
Flood	0 30 after	E. by N	3.5	2 0
Flood	2 20 after		2.0	
End of flood	3 20 after			
Ebb	5 30 before	W. by N	3.0	2 30
End of ebb	2 0 before			
In the Zuidcoote Pass:				
Flood	0 20 before	E. by N	3.0	
Flood	0 45 after	N.E. by E. and E. by N.	3.5	2 30
Flood	1 40 after	E. by N	2.0	
End of flood	3 40 after			
Ebb	5 0 before	W	1.5	
Ebb	5 20 before	W. by S	3.0	
Ebb of ebb	2 10 before			

APPENDIX I.

Particulars of dry docks, patent slips, etc.

Port.	Name of dock.	Length.		Breadth of entrance (M.H.W.S. level).	Depth at M. H.W.S.		Lifting power.	Date built.	Remarks.
		On blocks.	Over all.		On sill.	On blocks.			
		Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Tons.*		
Dunkerque	Government No. 1	351	366	63¼	26	25⅝		1888	
	Government No. 2	354	366	60	21	20⅝			
	Government No. 3	279	295	60	21	20⅜			
	Government No. 4	608½	625	86¼	26⅛	26⅓			
	Patent slip		246		23		1,000		
	Gridiron		197				500		
Gravelines	Gridiron		65			11¼			
Calais	Dry dock (Government)	426	[1] 504⅝	68½	28½	28½		1889	
Boulogne	Floating dock	196¾	236	47¼	18	16⅓	1,300		Boulogne—The larger Gridiron will take a vessel of 1,500 tons displacement.
	Gridiron		316	27¼		15½			
	Gridiron		62¼	20¾					West of the Avant port.
	Patent slip	213 Cradle.			Forward. Aft.	7½ 15	900		
St. Valery-sur-Somme	Gridiron		98½	23					
Dieppe	Dry dock (Government)	329½	361	67	26	26¾		1896	
Fecamp	Gridiron		165			18			
Le Havre	A. Irasque et Cie No. 1	196¾	249¼	34½	18¼	16⅓			Havre—A vessel 557 feet long can be taken in Dock No. 5 by placing the caisson in the outer stop.
	A. Irasque et Cie No. 2	202	234	41	19¾	19			
	A. Irasque et Cie No. 3	249	288	51	21½	20½			
	A. Irasque et Cie No. 4	533½	674	97	28	29⅛			
	A. Irasque et Cie No. 5	492	621½	64¼	28	28½			
	A. Irasque et Cie No. 6	377	500	51¼	25¼	25⅔			
	A. Irasque et Cie No. 7		984⅛	124½	51½				Building.
Rouen	Dry dock		492	72	35½				Proposed.
	Patent slip	295 Cradle.			Forward. Aft.	14½	1,800		Rouen—Slip is available for vessels 312 feet in length. The cradle is in two parts, which can be used together or separately. Vessels are hauled up sideways.
Honfleur	Gridiron		230	33¾	Forward. Aft.	12 14			
Trouville	Gridiron		160						

[1] With caisson in outer stop.

Particulars of dry docks, patent slips, etc.—Continued.

Port.	Name of dock.	Length.		Breadth of entrance (M.H W. S. level).	Depth at M. H.W.S.		Lifting power.	Date built.	Remarks.
		On blocks.	Over all.		On sill.	On blocks.			
Courseulles	Careening slip	....	459	115	....	....	....	....	
Cherbourg	Government No. 1	295	341	65	32⅓	....	....	....	Cherbourg—The Government docks can be used by merchant vessels too large to use the commercial dock, by special permission from the minister of marine. The commercial dock has taken a vessel 252 feet in length by special arrangements. There is also a heaving-down slip, 147 feet long and 196 feet wide, used principally for breaking up ships, etc.
	Government No. 2	328	374	65	32⅓	....	....	....	
	Government No. 3	328	374	65	32⅓	....	....	....	
	Government No. 4	295	341	65	32⅓	....	....	....	
	Government No. 5	....	656	95⅔	36¼	....	....	....	
	Government No. 6	590½	603½	65	29⅛	....	....	....	
	Government No. 7	229½	229½	63½	20½	....	....	....	
	Government No. 8	213	257½	62½	20¼	....	....	....	
	Homet, Government	....	885	114⅝	47	....	....	....	Building.
	Commercial	238	259	46	19¼	18	....	1880	
Granville	Dry dock	213½	242⅔	47	22½	22½	....	1882	
St. Malo	Gridiron	164	164	37	21½	18½	....	1885	
	Gridiron (St. Servan)	....	171	40	23	20	....	....	
	Dry dock	439⅔	449⅔	58½	32¾	32½	....	....	Building.
Guernsey	Patent slip (St. Peter Port)	145 Cradle.	....	....	Forward. Aft.	12 15	600	....	
	Patent slip (St. Peter Port)	130 Cradle.	....	....	Forward. Aft.	12 15	600	....	
	Patent slip (St. Sampson)	110 Cradle.	....	....	Forward. Aft.	12 15½	500	....	
	Patent slip (St. Sampson)	110 Cradle.	....	....	Forward. Aft.	12 15½	500	....	

APPENDIX II.

Particulars of wet docks, basins, locks, etc.

Port.	Name of dock, basin, etc.	Area.	Length.	Breadth.	Depth.	Entrance. Depth at H. W. O. S.	Entrance. Width.	Lock. Length.	Lock. Breadth.	Lock. Depth on sill at L. W. O. S.	Lock. Quayage.	Date built.	Remarks.
		Acres.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*		
Dunkerque......	Basin de Freycinet........	55½	3,600	Varies....	....	24½ 35¾	68¾ 82	Ecluse de l'Ouest. 384 Ecluse Trystram. 557	68¾ 82	7½ 19	 18,252	....	Dunkerque—Bassins de Freycinet and du Commerce are entered from the tidal harbor. A new basin (No. 5) is constructing.
	Bassin de la Marine.......	7½	985	261 Average.	....	20¾ 24	52½ 68¾	....	....	....	....	....	Bassin de la Marine is entered by gates from Bassin de Freycinet, and a lock from the Bassin du Commerce.
	Bassin du Commerce......	14½	1,640	361 Average.	....	20¾ 20¾	43 68¾	Ecluse de la Citadelle. 174 Ecluse de Barrage. 164	42½ 68¾	4 4	2,296 3,432	....	
	Bassin de l'Arriere Port...	6	985	262 Average.	....	20¾	45¾	....	....	....	1,706	....	Bassin de l'Arriere Port is entered from Bassin de la Marine. There are two floating cranes of 10 and 40 tons, respectively.
Gravelines.......	Bassin Vauban...........	6	1,968	147 Average.	....	18	33 26	....	....	....	1,968	....	
Calais...........	Bassin de l'Ouest.........	5½	1,311	210	....	20½	55¾	....	....	....	1,800	....	
	Bassin Carnot	23	2,620	655–485	....	28¾	68¼ 46¼	436 451	69 46	7¾ 7¾	6,393	1889	
Boulogne........	Bassin-a-flot.............	17	1,270	558 Average.	....	29½	69	328	69	4½	3,430	....	Boulogne—Bassin Loubet is under construction, and will probably be open in 1913.
	Bassin Loubet...........	....	1.050	576 Average.	....	....	....	....	....	....	....	....	
Treport.........	Bassin du Canal d'Eu.....	5¾	985	285	13	19	52½	130	52½	Dry.....	872	....	Treport — The Bassin du Canal d'Eu is being dredged, and it is intended to have a least depth of 19½ feet at springs, and 11½ feet at neaps.

Particulars of wet docks, basins, locks, etc.—Continued.

Port.	Name of dock, basin, etc.	Area.	Length.	Breadth.	Depth.	Entrance. Depth at H. W. O. S.	Entrance. Width.	Lock. Length.	Lock. Breadth.	Lock. Depth on sill at L. W. O. S.	Quayage.	Date built.	Remarks.
		Acres.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*		
Dieppe	Bassin Duquesne	6½	787	369 Average.		24	54		54	Dry.			Dieppe—Bassin Duquesne communicates directly with the inner port. Darse de Peche communicates with the outer port and with Bassin Duquesne. It is reserved for fishing vessels. Bassin Berigny is entered from Bassin Duquesne. Bassin de la Retenue is entered from the inner port through the Bassin de mi-maree.
	Darse de Peche (Tidal)	2	459			24	54						
	Bassin Berigny	9	985	394		23	46						
	Bassin de mi-maree	3½	492	329		32	59						
	Bassin de la Retenue	12	1,706	289 Average.		24	54						
St. Valery-en-Caux.	Bassin de la Retenue	6	755	262		24	30½	138	30½	Dry.			Bassin Duquesne is opened every tide, day and night, for all vessels. Bassin Berigny the same, excepting that it is only open at night for steam vessels.
Fécamp	Bassin Berigny		1,247	296 Average.	25¾	30½	52	360	52	6½	2,887		Bassin Berigny is entered from the Avant port.
	Nouveau Bassin	4½	623	327 Average.		22 29	65½	393	65½	3	1,706	1906	Nouveau Bassin is entered from the Gayant basin by a half-tide basin.
Le Havre	Bassin du Roi		525	246 Average.		21½	52½				1,342		Havre—The Bassins du Roi, de la Barre, de la Citadelle, and de l'Eure are entered from the Outer harbor; Bassin du Commerce from Bassin du Roi or Bassin de la Barre; Bassins Vauban, du Dock, and Bellot from Bassin de l'Eure;
	Bassin du Commerce		1,804	328		20¼	44¾				4,134		
	Bassin de la Barre		1,480	540 Average.		21½	44¾				3,872		
	Bassin Vauban		2,680	328		20 25	39 52½				6,367		
	Bassin de la Citadelle		1,115 690	361 261		30½ 23¾	52¾ 52½	203	53	8	4,332		
	Bassin de l'Eure		3,083	656	31½	34	100	793	85–98	16¾	6,726		

	Bassin du Dock	....	1,829	262	....	27½	52½	....	....	....	4,069	....	Bassin de la Citadelle has also communication with Bassin de l'Eure, and Bassin de Vauban with Bassin de la Barre. The Canal de Tancarville is entered from Bassin de l'Eure and Bassin Bellot. The tide at Havre only rises and falls 13 inches for a period of 3 hours near the time of high water, and many vessels can enter or leave the docks on the same tide.
	Bassin Bellot W	53	1,444	722	....	33¾	98½	....	....	....	8,697	....	
	Bassin Bellot E		1,656										
	Canal de Tancarville	....	1,811	196	....	....	49	177 177 590	52½ 52½ 98	27½ 23¼	....	....	
	Bassin Fluviale												
Honfleur	Bassin de l'Ouest	....	426	256	....	15¼	33¾	....	....	....	985	....	Communicate with the Avant port.
	Bassin du Centre	....	426	295	....	19½	40	....	....	....	1,315	....	
	Bassin de l'Est	....	985	236	....	21	54	....	....	....	2,360	....	Communicates with the Bassin de l'Est.
	Quatrieme Bassin	....	2,625	229	....	22½	42½	....	....	....	1,250	....	
Trouville	Bassin Unique	....	985	262	....	19	40½	....	....	....	2,158	....	
Caen	Wet dock	....	1,890	177	14½ aver-age.	16½	40	164	49¾	....	4,344	....	Caen—This dock is reached by a canal from Ouistreham, about 7½ miles in length.
Ouistreham	Wet dock	....	960	300	....	27	59	230 295	59	8	656	....	
Courseulles	Wet dock	....	960	183	10	10½	34	....	....	....	....	....	
Carentan	Wet dock	....	4,757	197-392	....	13½	39	137¾	39	Dry.	....	....	
Cherbourg	Bassin du Commerce	12¾	1,368	417	23-16½	16½ 23	42½ 52½	....	....	....	3,096	....	
Granville	Grand Bassin	8	708	457	17¾-23	24	54½	246	54	Dry.	2,157	1856	Granville—The Petit Bassin communicates with Grand Bassin by a cutting 65 feet wide, the sill being 7½ feet above the lock sill.
	Petit Bassin	3	444	304	11 -16½	16¼	39½	....	....	....	1,308	1873	
St. Malo	Bassin de St. Malo	33	2,360	460	23	31	57	304	57	....	2,242	1884	St. Malo—The basin empties into the harbor by a sluice.
	Bassin de St. Servan	29	1,974	656	23	31	57	304	57	....	1,285		
	Reservoir Interieure	66	1,443	950	10 -23	21½-23	42½	219	42	....	....	1884	The Reservoir Interieure is entered from the Bassin de St. Servan.
Legue St. Brieuc	Wet dock	....	975	213 Average.	....	24	47	213	47	Dry.	1,145	....	
Paimpol	Wet dock	....	673	289 Average.	....	23	39½	147	39½	Dry.	911	....	Paimpol—The Old Tidal harbor has been converted into a wet dock.
	Wet dock	....	574	246	16½	....	....	197	39	....	1,607	....	
Morlaix	Wet dock	....	3,937	144 Average.	....	16½-18½	52½	207	52½	Dry.	3,500	....	Morlaix—There is a sliding place in this dock above the lock wide enough to allow swinging room to vessels up to 206 feet in length.

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